

AD-A277 390



UNCLASSIFIED

(White Book)



Defense Nuclear Agency
Fiscal Year 1995



Program Document

**Research, Development, Test and
Evaluation, Defense Agencies (U)**

(Supports Congressional Budget Estimates)
February 1994



94-09239

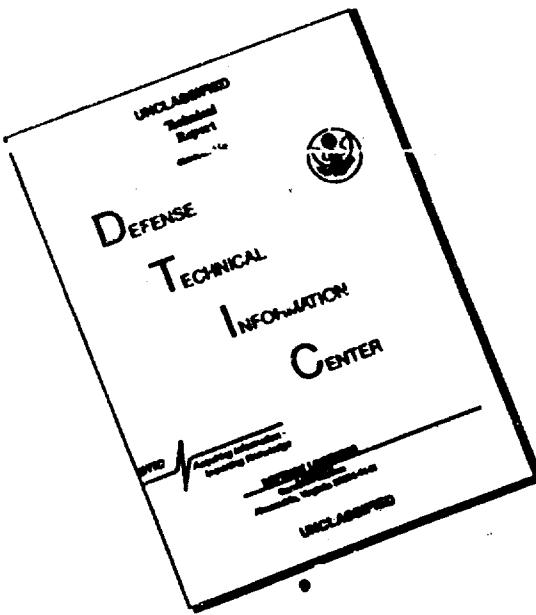


Cleared for Open Publication
OASD(PA) DFOISR 94-C-128

UNCLASSIFIED

94 3 24 024

DISCLAIMER NOTICE



**THIS DOCUMENT IS BEST
QUALITY AVAILABLE. THE COPY
FURNISHED TO DTIC CONTAINED
A SIGNIFICANT NUMBER OF
PAGES WHICH DO NOT
REPRODUCE LEGIBLY.**

UNCLASSIFIED

FY 1995 BUDGET ESTIMATES

RESEARCH, DEVELOPMENT, TEST AND EVALUATION DESCRIPTIVE SUMMARIES

DEFENSE NUCLEAR AGENCY

FEBRUARY 1994

UNCLASSIFIED

UNCLASSIFIED

PROGRAM ELEMENT DESCRIPTIVE SUMMARIES INTRODUCTION AND EXPLANATION OF CONTENTS

FY 1995 BUDGET ESTIMATES

FEBRUARY 1994

1. General. This document has been prepared to provide information on the Defense Nuclear Agency Research, Development, Test and Evaluation (RDT&E) Program to Congressional committees during the FY 1995 hearings. The Descriptive Summaries provide narrative information on all RDT&E Program Elements and projects.

2. Comparison of FY 1993 and FY 1994 Data. A direct comparison of FY 1993 and FY 1994 data in the Program Element Descriptive Summaries dated April, 1993, will reveal significant differences. Many of the differences are attributable to the following factors:

a. Program Element #0602715H Defense Nuclear Agency: This program element was decreased by \$55.2 million in FY 1994 as a result of Congressional action.

b. Program Element #0602790H Small Business Innovative Research: This program element was deleted by Congressional action.

c. Program Element #0603711H Verification Technology Demonstration: This program was increased in FY 1993 by \$12.2 million as a result of transfers to support Cooperative Threat Reduction. The program was decreased by \$5.0 million in FY 1994 as a result of Congressional action.

3. Relationship of FY 1995 Budget Structure to the FY 1994 Budget Approved by Congress. All program elements contained in this submission appear on the Base for Reprogramming Action (DD Form 1414) for RDT&E Defense Nuclear Agency, which was prepared pursuant to final Congressional action on the FY 1994 DoD Budget Submission to Congress.

4. Classification. This document is unclassified.

UNCLASSIFIED

UNCLASSIFIED

DEFENSE NUCLEAR AGENCY

RESEARCH, DEVELOPMENT, TEST AND EVALUATION, DEFENSE AGENCIES

ALPHABETICAL INDEX

<u>P.E. TITLE</u>	<u>P.E. NUMBER</u>	<u>PAGE NUMBER</u>
Defense Nuclear Agency	0602715H	
Small Business Innovative Research	0602790H	
Superconductive Magnetic Energy Storage	0602109H	
Verification Technology Demonstration	0603711H	

UNCLASSIFIED

UNCLASSIFIED

DEFENSE NUCLEAR AGENCY

RESEARCH, DEVELOPMENT, TEST AND EVALUATION, DEFENSE AGENCIES

R-1 LINE ITEM ORDER INDEX

P.E. TITLE	P.E. NUMBER	R-1 LINE ITEM	PAGE NUMBER
Superconductive Magnetic Energy Storage	0602109H	2	
Defense Nuclear Agency	0602715H	2	
Small Business Innovative Research	0602790H	2	
Verification Technology Demonstration	0603711H	3	

UNCLASSIFIED

DEFENSE NUCLEAR AGENCY
RESEARCH, DEVELOPMENT, TEST AND EVALUATION, DEFENSE AGENCIES

SUMMARY BY RESEARCH CATEGORY
(\$ in thousands)

(THIS SUMMARY IS UNCLASSIFIED)

	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999
6.1 Basic Research							
6.2 Exploratory Development	408,741	233,154	231,978	243,348	253,334	272,974	282,771
6.3 Advanced Development	67,292	40,896	41,063	35,163	32,809	33,770	35,489
6.4 Demonstration and Validation							
6.5 Engineering and Manufacturing Development							
6.6 RDT&E Management Support							
6.7 Operational Systems Development							
Total Research & Development (Program 6)							
Total Operational Systems Program							
Total RDT&E - Direct Reimbursement	476,033 9,942	274,050 14,000	273,041 11,200	278,511 10,800	286,143 10,500	306,744 10,200	318,260 10,200
Total Program	<u>485,975</u>	<u>288,050</u>	<u>284,241</u>	<u>289,311</u>	<u>296,643</u>	<u>316,944</u>	<u>328,460</u>

DEFENSE NUCLEAR AGENCY
RESEARCH, DEVELOPMENT, TEST AND EVALUATION, DEFENSE AGENCIES

SUMMARY BY BUDGET ACTIVITY

(\$ in Thousands)

(THIS SUMMARY IS UNCLASSIFIED)

	<u>FY 1993</u>	<u>FY 1994</u>	<u>FY 1995</u>	<u>FY 1996</u>	<u>FY 1997</u>	<u>FY 1998</u>	<u>FY 1999</u>
1. Basic Research							
2. Exploratory Development	408,741	233,154	231,978	243,348	253,334	272,974	282,771
3. Advanced Development	67,292	40,896	41,063	35,163	32,809	33,770	35,489
4. Development and Validation							
5. Engineering and Manufacturing Development							
6. RDT&E Management Support							
7. Operational Systems Development							
Total RDT&E - Direct	476,033	274,050	273,041	270,511	286,143	306,744	318,260
Reimbursment	9,942	14,000	11,200	10,800	10,500	10,200	10,200
<u>Total Program</u>	<u>485,975</u>	<u>288,050</u>	<u>284,241</u>	<u>289,311</u>	<u>296,643</u>	<u>316,944</u>	<u>328,460</u>

RESEARCH, DEVELOPMENT, TEST AND EVALUATION, DEFENSE AGENCIES
DEFENSE NUCLEAR AGENCY

SUMMARY BY FYDP PROGRAM
(\$ in Thousands)

(THIS SUMMARY IS UNCLASSIFIED)

	<u>FY 1993</u>	<u>FY 1994</u>	<u>FY 1995</u>	<u>FY 1996</u>	<u>FY 1997</u>	<u>FY 1998</u>	<u>FY 1999</u>
0602109H Superconductive Magnetic Energy Storage	20,000	- 0 -	- 0 -	- 0 -	- 0 -	- 0 -	- 0 -
0602715H Defense Nuclear Agency	388,741	233,154	231,978	243,348	253,334	272,974	282,771
0603711H Verification Technology Demonstration	67,292	40,895	41,063	35,163	32,803	33,770	35,489
Total RDT&E - Direct Reimbursement	476,033 9,942 _____ 485,975	274,050 14,000 _____ 288,050	273,041 11,200 _____ 284,241	278,511 10,800 _____ 289,311	286,143 10,500 _____ 296,643	306,744 10,200 _____ 316,944	318,260 10,200 _____ 328,460

RESEARCH AND DEVELOPMENT ACTIVITIES
Defense Nuclear Agency
(Dollars in Thousands)

		FY 1993	FY 1994	FY 1995
Basic Research	BA	-0-	-0-	-0-
	Outlays	-0-	-0-	-0-
Applied Research	BA	408,741	233,154	231,978
	Outlays	357,359	315,500	255,067
Facilities included in R&D	BA	-0-	-0-	-0-
	Outlays	-0-	-0-	-0-
Facilities included in MILCON	BA	-0-	-0-	-0-
	Outlays	26,999	15,874	7,793
MILPERS R&D	BA	-0-	-0-	-0-
	Outlays	-0-	-0-	-0-
Special Foreign Currency	BA	-0-	-0-	-0-
	Outlays	-0-	-0-	-0-
Conduct of R&D performed by colleges and universities	BA	4,615	4,977	909
	Outlays	2,945	4,341	2,909

UNCLASSIFIED

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 06021C9H
PE Title: Superconductive Magnetic Energy Storage

Budget Activity: Exploratory Development
Date: February 1994

A. RESOURCES: (\$ in Thousands)

Project Title	FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate
Superconductive Magnetic Energy Storage (SMES)	0	0	0	0	0	0	0

B. BRIEF DESCRIPTION OF ELEMENT: SMES is a research and engineering effort to develop technology for storing electrical energy in superconducting coils. Superconducting materials have no electrical resistance when they are cooled to cryogenic temperatures. Consequently, electrical currents in the superconducting coils and their induced magnetic fields persist as long as the coils maintain their electrical integrity and superconducting properties. Electrical energy is stored in the magnetic field surrounding the coil and is available to satisfy large, instantaneous power requirements for military applications such as advanced directed and kinetic energy weapons as well as for commercial applications such as utility load-leveling. FY 1993 funds withheld by OSD; Defense Authorization Act (Conference Report 103-357) transferred this program and associated funding to the Department of the Navy.

C. JUSTIFICATION FOR PROJECT: Not applicable.

Work Performed By: Not applicable.

Related Activities: Not applicable.

Other Appropriation Funds: Not applicable.

International Cooperative Agreements: Not applicable.

UNCLASSIFIED

UNCLASSIFIED

FY 1995 RD&E DESCRIPTIVE SUMMARY

Program Element: 0602715H
 PE Title: Defense Nuclear Agency

Budget Activity: Exploratory Development
 Date: February 1994

A. RESOURCES (\$ in Thousands)

Project Number & Title	FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	Total Program
AA Underground Test	57408	0	0	0	0	0	0	Terminated
AB Test & Simulation Technology	67934	65562	70692	73359	76327	87631	86345	Continuing
AC Weapon Systems Lethality	71019	45670	54339	59408	63790	66445	72305	Continuing
AD Bi-medical/LifeSciences	17292	0	0	0	0	0	0	Transferred
AE Weapon Safety & Operational Support	39113	31035	27293	26643	31944	32603	34080	Continuing
AF Weapon Systems Operability	69945	51697	50460	52183	52179	56824	60173	Continuing
AG Scientific Computations & Information Systems	42906	19147	19815	21304	20900	23370	24767	Continuing
AH Counter Proliferation Technical Support	796	5271	4279	5851	5194	3101	2101	Continuing
AI Test Site Decommissioning	0	10772	5100	4600	3000	3000	3000	Continuing
AY Bioenvironmental Hazards Research	2910	4000	0	0	0	0	0	
AZ Los Alamos National Lab, Meson Physics Facility	14550	0	0	0	0	0	0	
Total	<u>383873</u>	<u>233154</u>	<u>231978</u>	<u>243348</u>	<u>253334</u>	<u>272974</u>	<u>282771</u>	

B. BRIEF DESCRIPTION OF ELEMENT: This program develops the technology base for operability and effectiveness of U.S. defensive and offensive systems and forces, plus the associated command, control, communications, and intelligence (C3I) assets. With the end of the cold war, a nuclear engagement between superpowers is increasingly unlikely; more likely is a regional conflict involving one or more adversaries that possess nuclear, biological or chemical (NBC) weapons. Deterring the proliferation of NBC weapons by rogue nations is paramount; but, should deterrence fail, the U.S. must possess forces to respond defensively and offensively to a proliferator's use or threatened use of NBC weapons. It is also imperative to preserve survivable, effective forces as a hedge against a resurgence of the former Soviet Union or any other nation aspiring to nuclear superpower status.

These post-cold war realities place a premium on defensive systems that can survive and operate without interruption in a nuclear environment. Especially critical are space-based sensor and communication platforms. It also requires that the U.S. possess a set of discriminate conventional and nuclear weapons to effectively attack an aggressor's most precious assets with minimal collateral effects, even if those assets are protected in hardened underground structures.

UNCLASSIFIED

UNCLASSIFIED

To meet stated objectives, DNA has restructured its work to eliminate activities based solely on cold war threats, and to meet the challenges of regional conflict contingencies. Specifically, the development of more capable aboveground radiation simulators will be accelerated; the underground nuclear effects test capability is being transitioned to a standby status; the underground test know-how is being archived and transferred to support tests involving aboveground simulators; a correlation is being established between underground test results and those from aboveground tests; new activities are planned to support DoD counter proliferation responsibilities and U.S. nuclear weapon safety and security are receiving emphasis. Efforts encompass:

- Development and operation of simulators (radiation, blast, thermal, radio propagation and optical/infrared background effects) to evaluate nuclear weapon effects on military systems.
- Development of theoretical and experimental techniques for predicting the prompt and enduring environments created by endo- and exo-atmospheric explosions and the response of military systems operating in these environments.
- Development of hardness assessment tools to support the acquisition of survivable weapon systems that are likely to employ unhardened off-the-shelf commercial components in the future.
- Development and validation of a design and testing methodology to underwrite the survivability of defensive and offensive systems without reliance on underground testing.
- Evaluation of weapons effectiveness against surface and hardened underground facilities associated with the proliferation of weapons of mass destruction throughout the world.
- Utilization of weapons effects information to support development of adaptive targeting methodologies.
- Conduct of quantitative safety assessments of stockpiled nuclear weapons systems and development and maintenance of nuclear weapons system safety databases.
- Support to CJNCs in nuclear force structure, logistics, and operations.
- Technical activities to underwrite DoD counter proliferation programs that focus on responding to the threat or reality of proliferation through neutralization of weapons of mass destruction and their supporting infrastructure, by force if necessary.

This program element is properly categorized as Exploratory Development. The activities encompassed are consistent with the description contained in the DoD Financial Management Regulation (DoD 7000.14-R). The activities include studies and development efforts and translate basic research into solutions for broadly defined military needs.

UNCLASSIFIED

UNCLASSIFIED

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 060271SH
PE Title: Defense Nuclear Agency

A. RESOURCES (\$ in Thousands)		FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999
Project Title	Actual	Actual	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate
Underground Test	57408	0	0	0	0	0	0	0

B. BRIEF DESCRIPTION OF PROJECT: The Defense Nuclear Agency has terminated its underground nuclear test (UGT) program. Based on Public Law 102-377, Title V., Section 507 (the "Hartfield Amendment" on nuclear testing), DIA began reducing its reliance on underground nuclear testing and redirected its efforts toward aboveground simulator development. As a result of this new position, DIA has proceeded as follows: (1) MIGHTY UNCLE test schedule for 1995 was cancelled. (2) DIA has continued environmental remediation, tunnel stabilization, tunnel preservation, and test methodology documentation. The costs and performance have been consolidated by establishing Project A1, Test Site Decommissioning.

C. PROGRAM ACCOMPLISHMENT AND PLANS:

FY 1993 Accomplishments:

- Terminated Underground Nuclear System Reliability Test originally scheduled for 1995.
- Finalized the construction of a safeguard testbed for restoring a UGT as required by the President's Stockpile Stewardship Program.
- Closed all but one of the three operational and five standby tunnel complexes.
- Developed an environmental cleanup plan in coordination with EPA and Nevada state environmental agencies.
- Initiated environmental cleanup of closed tunnel complexes.
- Begun documentation of UGT design criteria and technical data to preserve technical knowledge, permit its use in other DoD programs, and allow restoration of UGT upon Presidential direction.
- Terminated Project AA.

Work Performed By: Lockheed Missle & Space Corporation, Sunnyvale, CA and Huntsville, AL; Science Applications International, Inc., San Diego, CA; EG&G Energy Measurements, Inc., Las Vegas, NV; S-Cubed, La Jolla, CA; Raytheon Services Nevada, Las Vegas, NV; BDM, Albuquerque, NM; Terra Tek, Salt Lake City, UT; Johnson Controls World Services, Las Vegas, NV; Allied Systems Technical Services (Bendix), Las Vegas, NV; Pac Tech, Claremont, CA; Tech Reps, Albuquerque, NM; REECO, Las Vegas, NV; USAE Waterways Experiment Station, Vicksburg, MS; Sandia National Laboratory, Albuquerque, NM; Department of Energy, Nevada Operations Office, Las Vegas, NV; Lawrence Livermore National Laboratory, Livermore, CA and Los Alamos National Laboratory, Los Alamos, NM.

UNCLASSIFIED

UNCLASSIFIED

Related Activities: This project is conducted in coordination with the OSD/ATSD(AE) and the DOE/DASMA, the Nuclear Weapon Council and its committees and with coordinated requirements from the Military Services (AF Space Division, BMO, etc.) and OSD (BMDO, SSTNF, etc.), Chairman, Joint Chiefs of Staff and Commanders in Chief of Unified and Specified Commands (e.g., STRATCOM) to satisfy system and operational requirements. There is no duplication. All of the activities at the Nevada Test Site are coordinated with the Department of Energy at the Nevada Test Site.

Other Appropriation Funds: None.

International Cooperative Agreements: Joint Working Group 26.

UNCLASSIFIED

UNCLASSIFIED

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 0602715H
PE Title: Defense Nuclear Agency

Project Number: AB
Budget Activity: Exploratory Development

A. RESOURCES (\$ in Thousands)		FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999
Project Title	Actual Estimate	Estimate						
Test and Simulation Technology	67934	65562	70692	73359	76327	87631	86345	

B. BRIEF DESCRIPTION OF PROJECT: This project provides test facilities and technologies that are used by the DoD Agencies and Services to evaluate the performance and operability of military command and control systems, missile defense assets, and space systems across the spectrum of threat environments. These simulation facilities support DoD test requirements for: (1) high explosives to simulate airblast, ground shock, and hardened facility response; (2) conventional weapons to test their capabilities and limitations including bombs, penetrating weapons, and enhanced payloads; (3) thermal and blast/thermal combined effects; and (4) x-ray, gamma-ray, and neutron radiation effects for surface, atmospheric, and space system survivability. This project funds the operations, maintenance and upgrades of the radiation simulators for x-ray, gamma-ray, electromagnetic pulse; optical and infrared scene generators and radio frequency propagation effects simulators; the DNA Tri-Service Thermal Radiation Test facility; and the future (IOC FY 1995) Large Blast/Thermal Simulator (LBTS). The project also supports advanced simulation technologies for developing improved but affordable future simulator capabilities. To compensate for the absence of nuclear tests, this project has been enhanced to provide alternative testbeds and to accelerate the development of more capable nuclear weapon effects simulators. This strategy requires the complementary development of "testable hardware" (funded under Project AF), which is specifically configured to allow high confidence validation testing of system operation using aboveground simulators.

This project includes the acquisition of the DECADE hard x-ray simulator, which will be operational by FY 1996 and which will satisfy most test requirements for electronics subsystem testing; the development of the JUPITER soft x-ray simulator (a joint DNA/DOE initiative) that will satisfy many of the soft x-ray nuclear test requirements for materials, optics and structures; and the development of the innovative enabling technologies in pulsed power, electrical switches, radiation sources and high energy density capacitors that future nuclear effects simulators will require. This project will also closely monitor the technical progress of Inertial Confinement Fusion (ICF) technologies and capitalize on potential breakthroughs as they occur. SBIR implementation is 570K for FY 1994 and 775K for FY 1995.

C. PROGRAM ACCOMPLISHMENT AND PLANS:

FY 1993 Accomplishments:

- Advanced Simulator Technology:
 - Initiated program to develop affordable technologies of power flow, opening switch, insulator, and radiation sources for advanced radiation simulators to insure operability of advanced reconnaissance, surveillance and communication satellites and tactical/strategic missile defense systems.
 - Continued development of Nuclear Optical Dynamics Display System (NODDS), maintained/upgraded existing Communications and Sensor Effects Simulators, and continued testing of PAVE PAWS using Radar Nuclear Effects Propagation Simulator (RNEPS).
 - Conducted three HE tests to evaluate ground shock propagation and structural survivability.

UNCLASSIFIED

UNCLASSIFIED

- Continued LBTS construction and upgraded ARES, Blackjack and Phoenix radiation simulators.
- Continued fabrication and testing of the first of 16 full-scale DECADE modules.
- Initiated JUPITER design concept study and system requirements study.
- Provided radiation simulator test beds for validating system-level hardness in support of Service requirements, including larger exposure areas and improved diagnostics/analysis.

FY 1994 Plans:

- Advanced Simulator Technology (111674)
 - Continue technology development for power flow, opening switch, insulator, and radiation sources, and initiate capacitor, debris shield, and pulsed power diagnostics for advanced radiation simulators.
 - Continue development of NODDS and the maintenance/upgrades of existing Communications and Sensors Effects Simulators; complete PAVE PAWS testing; initiate test of USA Universal Modem and MILSTAR terminals; initiate development of Advanced Channel Simulator (ACS) for satellite communication links test and Ground-Based Radar (GBR) Simulator.
- Above Ground Nuclear Effects Simulator Development and Acquisition (333760)
 - Complete construction and characterization of the LBTS facility and procure prototype (thermal) simulator hardware.
 - Bring ARES on line for full scale High Altitude Electromagnetic Pulse (HEMP) simulator system testing to DoD Standard 2169A.
 - Complete the fabrication and assembly of the first four of 16 modules of the DECADE Simulator and the building construction.
- Continue JUPITER concept definition and begin concept demonstrations.

- Above Ground Nuclear Effects Simulator Operations (19558)
 - Identify shortcomings and upgrade requirements of radiation simulators based on Above Ground Test/Underground Test (AGT/UGT) correlation data base.
 - Continue operation and maintenance of existing facilities including instrumentation development for specific test needs.
 - Conduct one ground shock test to investigate shock propagation in jointed rock.

FY 1995 Plans:

- Advanced Simulator Technology (117136)
 - Continue the development of affordable technologies for advanced radiation simulators, to include power flow, opening switches, radiation sources, capacitors, debris shields, and pulsed power diagnostics.
 - Complete development of NODDS; continue development of ACS and GBR; conduct maintenance, upgrade, and testing on existing communications and sensors simulators.
- Above Ground Nuclear Effects Simulator Development and Acquisition (25740)
 - Complete DECADE Simulator assembly and prepare for customer testing.
 - Complete concept definition for JUPITER simulator and construct engineering module.
- Above Ground Nuclear Effects Simulator Operations (27041)
 - Execute one ground shock test.
 - Continue operations and maintenance at ARES and thermal facilities and start customer testing on LBTS.
- Continue operations and maintenance of Radiation Simulator Facilities.

Work Performed By: Science Application Incorporated, San Diego, CA; Maxwell Laboratories, Inc., San Diego, CA; Mission Research Corporation, Santa Barbara, CA; Physics International Company, San Leandro, CA; General Electric, Valley Forge, PA; Honeywell, Inc., Minneapolis, MN; Bendix Field Engineering Corp., Columbia, MD; University of Dayton, OH; various DOE and DOD Service Labs; White Sands Missile Range, NM; Phillips Lab, NM.

UNCLASSIFIED

UNCLASSIFIED

Related Activities: This project is conducted in coordination with the Office of the Secretary of Defense, Director of Test and Evaluation; Chairman, Joint Chiefs of Staff; Military Acquisitions Departments; Ballistic Missile Defense Organization; US Space Command; US Army Strategic Defense Command; Commanders in Chief of Unified and Specified Commands; and US Air Force Material Command. There is no duplication.

Other Appropriation Funds: Program element 0602715H, Project #000092, DECADE Simulator (MILCON), and Project #000091, Large Blast Thermal Simulator (MILCON).

International Cooperative Agreements: Foreign Military Sales cases and Technical Exchange Agreements among our NATO Allies and the French government.

UNCLASSIFIED

UNCLASSIFIED

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 060271SH
PE Title: Defense Nuclear AgencyProject Number: AC
Budget Activity: Exploratory Development

A. RESOURCES (\$ in Thousands)		FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999
Project Title	Actual Estimate							
Weapon Systems Lethality	71019	45670	54339	59408	63790	66445	72305	

B. BRIEF DESCRIPTION OF PROJECT: This project develops lethality criteria for the full spectrum of conventional and nuclear weapons, including precision guided munitions and advanced conventional/unconventional payloads.

The target base includes hard and superhard underground facilities, fixed surface facilities, and sea-based structures. The program relies extensively on laboratory scale experiments, intermediate- and full-scale field tests, operational test data, and advanced numerical methods to quantify functional and physical damage criteria and to evaluate advanced sensor technology for battle damage assessment. This project includes development and demonstration of conventionally driven advanced electromagnetic sources for application against electronic targets. Research will be conducted to evaluate enhanced payload concepts for use against hardened underground facilities. Project results will be provided to operational planners through analytic prediction tools, multimedia hypertext databases, and technical manuals developed in concert with the applied research. Central to this support is an automated expert system to assist in pre-strike target planning and post-strike battle damage assessment. Technology transfer from this project will enable civil agencies to assess engineering designs for mitigating direct and collateral effects of terrorist attacks such as occurred at the World Trade Center. On a broader scale, improvements in weapon effects and target response codes will be used to upgrade and expand physics-based modeling and simulation in support of Distributed Interactive Simulation (DIS). These improved codes include atmospheric transport and dispersal of chemical/biological agents, and underwater explosion environments in the presence of coastal sea bottoms to support mine warfare effectiveness in targeting, explosive countermining and survivable ship design. An electrothermal chemical (ETC) gun advanced technology demonstration (ATD) is being conducted jointly with the Navy to achieve range enhancements of 400% over current 5" guns. The understanding of weapon-target interaction resulting from this project will assist in generating weapon development requirements against the changing worldwide target base to counter the proliferation of weapons of mass destruction. SBIR implementation is \$439K for FY 1994 and \$606K for FY 1995.

C. PROGRAM ACCOMPLISHMENT AND PLANS:

FY 1993 Accomplishments:

Conventional Weapons Effects

- Executed 29 precision conventional weapons effects tests to validate lethality criteria for hard targets.
- Screened candidate sensors for hard target battle damage assessment.
- Analyzed effectiveness of undersea mines resting on, or buried within, various sediments.
- Conducted first operational exercise of prototype automated Munitions Effects Assessments (MEA) system for one target type.
- Completed MEA prototype for targeting hardened cut and cover bunkers.

Collateral Effects

- Developed advanced numerical methods to predict dispersal of chemical/biological/radioactive clouds.
- Enhanced Payloads
- Conducted RF payload initial feasibility demonstration test.

UNCLASSIFIED

UNCLASSIFIED

ETC Gun
- Continued ETC cartridge development and set world's record for muzzle energy from the Navy's 5" gun (demonstrating the capability to double existing range.)

FY 1994 Plans:

- Conventional Weapons Effects (19330)
 - Execute 30 conventional weapons tests against hardened buried structures to validate lethality criteria.
 - Execute four Inert BLU 113 drops and two BLU 109 live fire tests on a multibay, multistory structure.
 - Field test existing sensor technology to assist in battle damage assessment of fixed hard structures.
 - Initiate development of an automated expert system for target weaponeering and munitions effectiveness assessment.
 - Begin testing to investigate shock effects of undersea bottom mines against shallow water targets.
 - Complete development of a multi-media munitions effects database.
 - Perform targeting effectiveness calculations in support of nuclear versus conventional trade-off studies for regional contingency planning.
- Collateral Effects (0129)
 - Develop and validate models for NBC hazards disposal; perform expulsion experiments for chemical/biological facilities.
 - Enhanced Payloads (3768)
 - Evaluate enhanced payload concepts for wide-area functional kills.
 - Investigate the utility of advanced accelerants against underground facilities and weapons of mass destruction.
 - ETC Gun (14004)
 - Optimize ETC gun cartridge design for enhanced Naval gunfire support, air defense and tactical missile defense; initiate a four year joint cooperative advanced technology demonstration.
 - Develop high energy-density materials for capacitors to support ETC program.

FY 1995 Plans:

- Conventional Weapons Effects (26284)
 - Conduct 23 conventional weapons effects tests to validate hard target lethality criteria.
 - Conduct two full-scale live fire tests of the GBU24/28 to validate performance improvements.
 - Conduct tests to assess the effectiveness of consecutive weapon delivery against hard targets.
 - Develop an integrated sensor collection system and data fusion architecture and field test at White Sands Missile Range.
 - Complete assessment of vulnerability of ships to shallow mines.
 - Evaluate Battle Damage Assessment sensor effectiveness using field test data for fixed hard structures.
 - Complete the multimedia hypertext version of the Air-to-Surface Joint Munitions Effectiveness Manuals.
- Collateral Effects (9573)
 - Establish real-time worldwide operational capability to predict hazardous material dispersal.
 - Conduct tests to quantify collateral effects hazard associated with downing cruise missile bearing Biological Weapon warheads.
 - Enhanced Payloads (3876)
 - Develop electromagnetic targeting concepts and demonstrate concept lethality on selected targets.
 - Field test enhanced payload concepts.
 - ETC Gun (14000)
 - Conduct shipboard integration portion of ETC Gun Advance Technology Demonstration to support DDG51 and Destroyer 2000 acquisition milestones.

UNCLASSIFIED

UNCLASSIFIED

- Develop long range hypervelocity precision guided projectile for the Navy's 5" ETC gun.
- Develop high energy-density capacitors in support of the Navy's ETC applications.

Work Performed By: Science Applications International Corp., Alexandria, VA; Weidlinger Associates, New York, NY; S-Cubed, La Jolla, CA; Applied Research Associates, Inc., Albuquerque, NM; California Research & Technology, Inc.; Chatsworth, CA; Kaman Sciences Corporation, Colorado Springs, CO; DOD and DOE government laboratories; KSC, Santa Monica, CA.

Related Activities: This project is conducted in coordination with the Air Combat Command, STRATCOM, Naval Sea Systems Command, Strategic and Theater Nuclear Forces, Chairman, Joint Chiefs of Staff, Military Departments, Defense Intelligence Agency, Ballistic Missile Defense Office and Commanders in Chief of Unified and Specified Commands. There is no duplication.

Other Appropriation Funds: None.

International Cooperative Agreements: United Kingdom - Joint Working Groups 36 and 43.

UNCLASSIFIED

UNCLASSIFIED

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 0602715H
PE Title: Defense Nuclear Agency

Project Number: AD
Budget Activity: Exploratory Development

A. RESOURCES (\$ in Thousands)							
Project Title	FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate
Biomedical/Lifesciences	17292	0	0	0	0	0	0

B. BRIEF DESCRIPTION OF PROJECT: This program is the only in-house Department of Defense (DoD) effort that investigates the biomedical effects of radiation from nuclear weapons accidents or environmental contamination. This unique research is conducted by the Armed Forces Radiobiology Research Institute (AFRRRI) which was transferred to the Office of the Secretary of Defense (Washington Headquarters Service) effective FY 1994. AFRRRI is the leading DoD authority on radiation effects and is dedicated to research to support the requirements of the Surgeons General of the Armed Forces. The requirements related to nuclear proliferation and radionuclide contamination emphasize strategies to: 1) increase survival of personnel through use of radio-protective drugs given before irradiation and/or use of new modalities for treatment of radiation casualties; 2) minimize deleterious effects, such as cancer and mutations, that may result from radiation exposures encountered on earth or in space; and, 3) maintain operational performance such as controlling a vehicle (aircraft, ship, or tank).

C. PROGRAM ACCOMPLISHMENT AND PLANS:

FY 1993 Accomplishments:

- Described radiation effect on muscular fatigue and weakness.
- Developed treatment protocol to control immune suppression.
- Identified drug combinations which enhance survival and maintain performance.
- Initiated cancer studies in vivo/in VITRO on heavy charged particles.
- Initiated program on microwave bioeffects.

Work Performed By: The National Academy of Sciences, Washington, DC; Merrifield Laboratory, Inc., Merrifield, VA; National Aeronautics and Space Administration, Langley Research Center, Hampton, VA; Lawrence Berkeley Laboratory, Berkeley, CA; National Institute of Science and Technology, Gaithersburg, MD; and the Uniformed Services University of Health Sciences, Bethesda, MD.

Related Activities: None.

Other Appropriation Funds: None.

International Cooperative Agreements: AFRRRI has the following Memoranda of Understanding: began in 1982 and is an on-going project - Centre de Recherches du Service De Sante des Armees (DEA 1125), France, to conduct research on the mechanism of radiation damage from nuclear weapons; began in 1986 and is an on-going project - Defense Research Organization, Netherlands, (DEA 0096), to exchange information on physical, biological, and medical aspects of radiations associated with nuclear devices and other radiation sources.

UNCLASSIFIED

UNCLASSIFIED

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 0602715H
PE Title: Defense Nuclear AgencyProject Number: AE
Budget Activity: Exploratory Development

Project Title	Actual	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999
Resource Type	Estimate						
Weapon Safety & Operational Support	39113	31035	27293	26643	31944	32603	34080

B. **BRIEF DESCRIPTION OF PROJECT:** This project: (1) improves nuclear weapons safety, security and survivability, employment planning, command and control, force structure, force effectiveness and engineering support for vulnerability assessments; (2) addresses the contribution of nuclear weapons effects to strategic nuclear employment objectives; (3) develops alternative strategies for U.S. strategic weapons employment; (4) conducts analyses, including impacts of possible Weapons of Mass Destruction (WMD) use, on nuclear force postures, force structure/mix, doctrine, tactics, operations and employment/deployment constraints; (5) explores technology needed to enhance theater U.S. and Allied command operations on an integrated battlefield; and (6) supports the development of synthetic environments for gaming applications and Distributed Interactive Simulation (DIS). SBIR implementation is \$200K for FY 1994 and \$300K for FY 1995.

C. PROGRAM ACCOMPLISHMENT AND PLANS:**FY 1993 Accomplishments:****Weapon System Safety Assessments**

- Continued the Quantitative Weapon System Safety Assessment (QSSA) of the Minuteman III/W78 Weapon System.
- Continued the Fire Resistance Enhancement (FRE) study of the enduring nuclear stockpile.
- Survivability Assessments of Operational Forces and Force Posture
- Initiated program to exploit Deceptive Practice (DP) technologies for defense of systems.
- Initiated laser guided air-to-ground munitions proof-of-concept.
- Completed Allied Command Europe (ACE) Survivable Nuclear Command and Control (C2) program.
- Completed Transportable Storage System proof of principle development.
- Designated by USD (A) as DoD Executive Agent for Nuclear Weapons Training: initiated DNA training program; began development of Joint DoD/DOE Nuclear Weapons Safety and Security Executive Course for Nuclear Weapons Council (NWC).

Technical Assessments for OSD, NWC, CINCs, Services and Joint Staff
- Completed Joint DoD/DOE weapon development concept design and feasibility studies, supported Project Officer's Group/Project Officer's Meeting (POG/POM).

Vulnerability Assessments on Fixed and Mobile Assets

- Completed five system survivability assessments on fixed and mobile C3 assets in support of US CINCs, National Command Authority, and NATO. Provided cost-benefit analysis for NATO downsizing.
- Supported six assessments of foreign hardened targets by other government agencies. Identified observables and signatures of underground facility operations. Developed generic targets for advanced weapons concepts.

FY 1994 Plans:

Weapon System Safety Assessments (10210)
- Complete the WSSA of the MIII/W78 system (2QTR, FY94).
- Continue the FRE study of the enduring stockpile.

UNCLASSIFIED

UNCLASSIFIED

- Initiate effort to examine safety issues associated with solid propellant fuels.

- Initiate a WSA of the B-52H Strategic Bomber Nuclear Weapon System.

- Initiate effort to adapt the MMII/W78 WSSA to a risk management model.

Survivability Assessments of Operational Forces and Force Posture (2700)

- Complete program to exploit DP technologies for Joint DOD use--transition FY 1995.

- Continue development of system to defeat laser guided air-to-ground munitions--proof of concept demonstration.

- Continue Weapons Secure Storage System (WS3) reconstitution test with US Air Force Europe.

- Provide engineering procurement cost analysis for use of modified International Organization for Standardization (IOS) Container for movement and storage of nuclear weapons.

Systems Research and Development for Operational Forces (5100)

- Develop/integrate automated mission planning systems, analytical tools and decision making aids for CINCEUR.

- Initiate hazard prediction integration and downsizing to support tactical use.

- Initiate integration of weapons effects for Distributed Interactive Simulation (DIS) architecture; develop and integrate weapon effects and synthetic environments for simulations and gaming applications.

DOD Executive Agent for Nuclear Weapons Training (900)

- Initiate training support to SACLAN and Services; continue development of Joint DoD/DOE Safety and Security Executive Course; initiate development of Counterproliferation Awareness Course; initiate development of Automated Nuclear Weapons Training System.

Technical Assessments for OSD, NWC, CINCs, Services and Joint Staff (6800)

- Conduct technical analyses for OSD (International Security Affairs, Net Assessment, Assistant to the Secretary of Defense/Atomic Energy) and Nuclear Weapons Council (NWC) on nuclear establishment, stockpile planning, drawdown, force structure, storage issues, weapons safety and security, counter-proliferation planning, regional security and stability.

- Conduct technical analyses to support CINCs, Services, and Joint Staff on force planning, Theater Missile Defense, counterproliferation, command and control, and regional security issues in light of the changing international security environment.

- Initiate at least two Joint DOD/DOE design/feasibility assessments and continue existing feasibility and support POG/POM.

Vulnerability Assessments on Fixed and Mobile Assets (5125)

- Conduct survivability assessments (five fixed and three mobile assets) and studies requested by CINCS, Joint and NATO Allies to support programmatic and investment decisions.

- Provide technical support to other government agencies conducting vulnerability assessments of foreign hardened facilities. Develop target characterizations for new concepts for accomplishing target kill with minimal collateral damage.

- Validate underground facility functional and signature models and expand to include WMD-related facilities.

FY 1995 Plans:

Weapon System Safety Assessments (68230)

- Continue the FRE study of the enduring stockpile.

- Continue the examination of solid propellant fuel.

- Continue the B-52H WSSA.

MSSA Risk Management Program.

Survivability Assessments of Operational Forces and Force Posture (1000)

- Transition Laser Countermeasures to USAF; expand application to USA/USN forces.

- Transition WS3 Regeneration to NATO and USAF.

- Conduct assessment for Pacific Command (PACOM) on survivability/security concepts.

UNCLASSIFIED

UNCLASSIFIED

Systems Research and Development for Operational Forces (4600)

- Continue development and integration of automated mission planning systems, analytical tools and decision making aids for CINCEUR.
- Continue hazard prediction integration and downsizing to support tactical use.
- Certify integration of weapons effects for DIS architecture; continue development and integration of weapons effects and synthetic environments for simulations and gaming applications.
- Continue developing Counterproliferation Awareness Course; continue developing Automated Nuclear Weapons Training Systems; continue training support to SACCLANT and Services.
- Continue technical analyses for OSD, NMIC, CINCs, Services and Joint Staff (7600)
- Conduct technical analyses for OSD(ISA, NA, ATSD/AE) and NMIC on nuclear establishment, stockpile planning, drawdown, force structure, storage issues, weapons safety and security, counterproliferation planning, regional security and stability.
- Conduct technical analyses to support CINCs, Services and Joint Staff on force planning, theater missile defense, counterproliferation, command and control, and regional security issues in light of the changing, international security environment.
- Complete Joint DOD/DOE weapon development feasibility study and continue or initiate other weapon development design or feasibility assessments, and support.
- Vulnerability Assessments on Fixed and Mobile Assets (4663)
- Accomplish survivability assessments tasked by CINCs, Joint Staff and NATO Allies to support programmatic and investment decisions.
- Assess survivability of selected fixed and mobile C3 assets subjected to single or combined nuclear/biological/chemical weapon employment.
- Validate underground and WMD-related facility signature models and provide to users targeting and weapon employment decisions.

Work Performed By: Science Applications International Corporation, La Jolla, CA; R&D Associates, Mons, Belgium; Lawrence Livermore National Laboratory, Livermore, CA; Sandia National Laboratory, Albuquerque, NM; Phillips Laboratory, Kirtland AFB, NM; General Dynamics/CONVAIR Division, San Diego, CA; Analytical Systems Engineering Corp., Burlington, MA; Logicon Inc., San Pedro, CA; Applied Research Assoc., Alexandria, VA; Mitre Corp., Bedford, MA; Science Control Technology Corp., Los Angeles, CA.

Related Activities: This Project is coordinated with the Assistant to the Secretary of Defense (Atomic Energy), Deputy Assistant Secretary of Defense for Policy Office of Strategic and Theater Nuclear Force, Defense Intelligence Agency Service Staffs, and Commanders in Chief of Unified and Specified Commands to support various systems (Cruise Missiles, KC-135, B-52, B1, B2). There is no duplication.

Other Appropriation Funds: None.

International Cooperative Agreements: None.

UNCLASSIFIED

UNCLASSIFIED

FY 1995 RDTE DESCRIPTIVE SUMMARY

Program Element: 060271SH
PE Title: Defense Nuclear AgencyProject Number: AF
Budget Activity: Exploratory Development

A. RESOURCES (\$ in Thousands)		FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999
<u>Project Title</u>	<u>Actual Estimate</u>	<u>Estimate</u>						
Weapon Systems Operability	51697	50460	52183	52179	56824	60173		

B. BRIEF DESCRIPTION OF PROJECT: This project provides the technology base support to ensure that current and future DoD Systems such as Command, Control, Communications, Computers and Intelligence (C4I) systems, aircraft and theater missile defense systems, as well as personnel can survive and operate effectively through the spectrum of conventional, biological, chemical and battlefield nuclear environments. Planned efforts will focus on methods to preserve the "functional" survivability of military systems to combined hostile effects. Special emphasis will be placed on developing technologies to support theater missile defense, DoD counter-proliferation, and the Distributed Interactive Simulation initiatives. The primary thrust of this program is to provide affordable system design and test technologies that take full advantage of commercial standards and practices. The principal products from this project are: 1) radiation-resistant memories and computers; 2) system design guidelines and standards to harden against integrated electromagnetic and combined battle-field effects; 3) nuclear weapons effects hardening and mitigation techniques; 4) correlations between above ground and underground testing methodologies to support the hardiness validation of electronics, optical materials and structures; 5) development of "testable hardware" designed to be validated without the use of underground tests; 6) state of the art environment and personnel performance assessment models and tools for evaluating the impact of nuclear, biological, chemical, and conventional effects on individual and force-level operations; 7) and the adaptation of nuclear weapons effects models for disaster consequence assessment. SBR implementation is \$1239K for FY 1994 and \$1578K for FY 1995.

C. PROGRAM ACCOMPLISHMENT AND PLANS:FY 1993 Accomplishments:
Radiation Resistant Electronic and System Technology Development and Transfer to DoD Systems

- Conducted first combined radiation and infrared scene test of a sensor subsystem.
- Completed qualification of radiation-hardened 256Kbit Static Random Access Memory (SRAM).
- Completed design of radiation-hard 1Mbit SRAM and began technology evaluation for 4Mbit SRAM.
- Conducted High-Altitude Electromagnetic Pulse (HEMP) tests for Strategic Command and Army Space Strategic Defense Command (SSDC).
- Completed development and initial demonstration of medium power microwave source.
- Designed small (less than 3 cubic inches), lightweight (less than 140 grams) radiation hardened computer.
- Provided nuclear environments for Air Force Space and Missile Systems Center (SMC) and Army SSDC.
- Evaluated HEMP effects in regional conflict scenarios.

Testable Hardware Technology

- Delivered correlation tool/data base for x-ray effects on electronic system.
- Initiated Phase I concept definition for testable hardware to provide design and test protocols for space systems and missile/interceptors to validate operability in an x-ray environment.
- Completed the development of a new HEMP standard for DoD systems.

UNCLASSIFIED

UNCLASSIFIED

- Developed and applied radiation environment models on performance of communications, radar, and sensor systems.
- Continued the evaluation of human response degradation from nuclear radiation.
- Completed engine dust ingestion and air data sensor testing.
- FY 1994 Plans:**
 - Radiation Resistant Electronic and System Technology Development and Transfer to DoD Systems (22594)
 - Initiate Joint Chiefs of Staff (JCS) and USD(A) directed development of combined battlefield environment effects (CBE) standards for electromagnetic, nuclear, chemical, and biological effects.
 - Continue development of radiation resistant ultra large scale integration (ULSI) microelectronics; fabricate one megabit demo circuits for USAF space applications.
 - Continue investigation the predictability of EMP effects; if feasible, develop quantitative prediction models.
 - Continue development of radiation hardened lightweight generic space computer for US Air Force; complete the Sensor Test Module (STM) for use in the Testable Hardware Program.
 - Testable Hardware Technology (11976)**
 - Correlate above ground test/underground test (AGT/UGT) data to develop minimum essential requirements for affordable radiation simulators.
 - Develop testable hardware designs and test protocols for space systems and missile/interceptor, prepare for proof-of-principle testing; initiate correlation data base and testable hardware for materials, optics and sensors.
 - Nuclear Environments and Modeling (14862)**
 - Develop and apply nuclear and natural radiation environments models in support of Defense Acquisition Board assessments of theater missile defense and space systems and for planning safe crew extra-vehicular activity.
 - Continue the development of models to evaluate human response to nuclear, chemical, and biological environments.
 - Develop Military Standard for acquisition of survivable systems and tools for estimating costs and evaluating performance of design options. (1026)
 - FY 1995 Plans:**
 - Radiation Resistant Electronic and System Technology Development and Transfer to DoD Systems (119834)
 - Continue CBE program in coordination with the Joint Chiefs of Staff, Assistant Secretary of Defense (C31) and the services; develop draft combined standards for coordination.
 - Continue ULSI hardened microelectronics technology development; demonstrate producibility of 1 megarbit circuits.
 - Complete investigation of the predictability of EMP effects; if quantifiable, incorporate results into regional scenario wargaming and training tools.
 - Complete radiation hardened lightweight generic space computer for US Air Force; provide computer to Testable Hardware program for AGT Technology Demonstration.
 - Testable Hardware Technology (14109)**
 - Complete correlation of optics/material data; develop data base for testable sensor designs; identify minimum requirements for radiation testing of sensor systems and materials.
 - Conduct proof-of-principle tests on space systems missile/interceptors and sensors.
 - Nuclear Environments and Modeling (13877)**
 - Continue to modify nuclear and natural radiation environment models in support of Defense Acquisition Board assessments of theater missile defense and space systems and for planning safe crew extra-vehicular activity.

UNCLASSIFIED

UNCLASSIFIED

- Incorporate models for evaluating human response to the combined effects of nuclear, chemical, and biological environments into the Distributed Information System and training tools.
- Develop Military Standard for acquisition of survivable systems and tools for estimating costs and evaluating performance of design options. (1062)

Work Performed By: Mission Research Corp., Santa Barbara, CA; Science Applications International Corp., Joppa, MD, Vienna, VA, & San Diego, CA; Pacific Sierra Research Corp., Santa Monica, CA & Rosslyn, VA; JAYCOR, San Diego, CA & Reston, VA; National Academy of Sciences, Washington, DC; BDM International, McLean, VA; Raman Sciences, Colorado Springs, CO; Texas Instruments, Dallas, TX; Honeywell, Minneapolis, MN; IBM, Manassas, VA; K-Tech, Albuquerque, NM; S-Cubed, La Jolla, CA; ARES Corporation, Rosslyn, VA; US Army Nuclear & Chemical Agency, Springfield, VA; various DoD and DOE laboratories.

Related Activities: This project is conducted in coordination with the Office of the Secretary of Defense; Chairman, Joint Chiefs of Staff; Military Departments; Ballistic Missile Defense Organization, Defense Information Systems Agency; Defense Intelligence Agency; National Security Agency; Commanders in Chief of Unified and Specified Commands and NASA. There is no duplication.

Other Appropriation Funds: None.

International Cooperative Agreements: Joint Working Groups 35 and 36. NATO Project Group 29, NATO Panel VII, NATO Research Study Group 23, NATO NBC Medical Working Group.

UNCLASSIFIED

UNCLASSIFIED

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 060271SH
PE Title: Defense Nuclear Agency

Project Number: AG
Budget Activity: Exploratory Development

<u>Project Title</u>	<u>Actual Estimate</u>	<u>FY 1993 Estimate</u>	<u>FY 1994 Estimate</u>	<u>FY 1995 Estimate</u>	<u>FY 1996 Estimate</u>	<u>FY 1997 Estimate</u>	<u>FY 1998 Estimate</u>	<u>FY 1999 Estimate</u>
Scientific Computations & Information Systems	42906	19147	19015	21304	20900	23370	24767	

B. BRIEF DESCRIPTION OF PROJECT: This project provides the High Performance Computing (HPC) capability databases and modeling resources that enable DNA and DIA contractors to execute and support programs in weapons effects, Cooperative Threat Reduction (CTR), nonproliferation, safe and secure dismantlement, lethality of conventional/nonconventional weapons and analysis and control of weapons of mass destruction. Calculations, models and codes are developed and used to aid the design of experiments, predict types and levels of measurements required, establish system design requirements, assess performance, and provide system-specific predictions of nuclear and conventional weapons effects to DoD planners. The principal thrust of the scientific computing activity is to enhance numerical simulation of conventional/nuclear explosion dynamics; modeling of nuclear survivability and hardness of structures, weapon lethality, and weapon safety and security; and understanding of warhead lethality and hard-target interactions; and radiation effects of nuclear weapons on communication systems, radars, and infrared and optical systems. This project supports DNA research and disseminates results by developing user-friendly interactive databases, technical archives, and design aids for systems developers. Provide user-friendly, rapid, accurate methods for calculating nuclear weapon effects; and for retrieval of nuclear weapons effects test data; and for technical descriptions of nuclear weapon effects.

C. PROGRAM ACCOMPLISHMENT AND PLANS:

FY 1993 Accomplishments:

Supercomputer and Communication Support

- Continued to provide supercomputer-based High Performance Computing Scientific Computing resources.
- Provided upgraded telecommunications circuits for the network.
- Completed High Performance Supercomputer Alternative Architecture Study and initiated modernization acquisition.

Nuclear Visualization Support to improve analysis of results.

- Established DNA connectivity to the DoD Defense Simulation Internet (DSI).
- Completed transition to the CRAY UNIX operating system.
- Completed request for proposal (RFP) for replacement of current CRAY XMP supercomputer used to support contractor research.

Nuclear Weapon Effects Computational Products

- Issued ten computational aids for calculating the effects of nuclear weapons to DoD users.
- Initiated development of Data Archival and Retrieval Enhancement (DARE).
- Advanced Computational Methods
- Completed 3-D models using advanced numerical computation techniques for explosion-generated dust cloud propagation and electrothermal-chemical (ETC) gun in-barrel ballistics.
- FY 1994 Plans:
 - Supercomputer and Communication Support (9041)
 - Install and complete acceptance testing of the new CRAY M90 replacement supercomputer.

UNCLASSIFIED

UNCLASSIFIED

- Establish tightly integrated Wide Area Network as part of the DoD HPC Modernization Program's Defense Research and Engineering Network (DREN) to interconnect DNA scientists, contractor researchers, other government agencies, and university sites to effectively support DNA research projects.
- Begin transition to Massively Parallel Processing computing for selected scientific codes and problems.

Nuclear Weapon Effects Computational Products (7736)

- Develop and issue new computational aids, technical brochures, and manuals for calculating nuclear weapon effects.
- Begin delivery of DNA's Data Archival and Retrieval Enhancement (DARE), and begin populating it with test data.

Advanced Computational Methods (2117)

- Validate advanced numerical dust cloud propagation model; apply ETC ballistics model to optimize propellant cartridge design.

FY 1995 Plans:

- Supercomputer and Communication Support (110692)
 - Continue to provide state-of-the-art supercomputer resources through full utilization of the new supercomputer's unique capabilities.
 - Begin upgrade of communications network backbone to the T-3 level through the DREN.
- Nuclear Weapon Effects Computational Products (7329)
 - Develop and issue new computational aids, technical brochures, and manuals for calculating nuclear weapon effects.
 - Complete delivery of and majority of population of DNA's Data Archival and Retrieval Enhancement.
- Advanced Computation Methods (1794)
 - Complete initial dust cloud propagation model documentation and deliver to users to support weapon employment decisions; develop enhanced model that addresses varied cloud viscosities and mach numbers.

Work Performed BY: Department of Energy, Albuquerque, NM; Los Alamos National Laboratory, Los Alamos, NM; Sandia National Laboratory, Albuquerque, NM; Pacific Sierra Research, Los Angeles, CA; S-Cubed, Albuquerque, NM; San Diego, CA; Eastern Computer, Inc., Virginia Beach, VA; Cherokee Information Systems, Arlington, VA; User Technology Associates, Arlington, VA.

Related Activities: None

Other Appropriation Funds: None

International Cooperative Agreements: None

UNCLASSIFIED

UNCLASSIFIED

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 060271SH
PE Title: Defense Nuclear AgencyProject Number: AH
Budget Activity: Exploratory Development

<u>Project Title</u>	<u>Actual</u>	<u>Estimate</u>	<u>Project Title</u>	<u>Actual</u>	<u>Estimate</u>	<u>Project Title</u>	<u>Actual</u>	<u>Estimate</u>
Counter Proliferation Technical Support	796	5271	FY 1994	5851	4279	FY 1995	5194	3101

B. BRIEF DESCRIPTION OF PROJECT: This project directly supports the development of DoD's counter proliferation acquisition strategy and specifically supports the ATSD(AE), USD(P) and Joint Staff activities. The project evaluates the collateral effects associated with weapon employment against nuclear, biological and chemical weapon facilities. The program consists of experiments and calculations to determine the effects of penetrating weapons on above and underground hardened and soft biological, chemical and nuclear storage/production facilities and transportation vehicles. The results of this program will enhance DNA's hazard prediction and assessment capability and improve targeting support algorithms. This project will also establish criteria for neutralizing chemical and biological agents by subjecting them to shock, thermal and ionizing radiation environments produced by conventional/nuclear weapons. Also included is defining cruise missile intercept criteria and potential for agent release during intercept and/or crash. This project also explores the impacts of proliferation on current and proposed force response options, targeting requirements and associated force structure. The program will assess possible nuclear, biological, and chemical (NBC) proliferation paths to identify criterial path nodes to guide intelligence collection requirements and military response (targeting) options. Finally, this project leverages other DNA technologies relevant to counter proliferation (hard target kill, enhanced payload, and weapons of mass destruction (WMD) signature assessment) by coupling them to counter proliferation-specific technologies (collateral effects, chemical/biological agent defeat, etc.) to develop/conduct selected technology demonstrations.

C. PROGRAM ACCOMPLISHMENT AND PLANS:
FY 1993 Accomplishments:

- Conducted laboratory experiments to evaluate dispersal hazards from strikes on chemical/biological/nuclear weapons facilities (production/storage/deployed).
- Initiated effort to evaluate dispersal hazard risk from strikes on nuclear reactors.
- Assessed the technical and operational impact of regional proliferation.

FY 1994 Plans:

- Collateral Effects and Neutralization (2700)
- Conduct tests to assess the collateral effects resulting from strikes on underground chemical and biological facilities.

FY 1995 Plans:
Effects and Neutralization (3329)

- Establish real-time worldwide operational capability to predict hazardous material dispersal.
- Complete collateral effects prediction software for biological and chemical storage facilities.

UNCLASSIFIED

UNCLASSIFIED

- Conduct small-scale testing to determine cruise missile crash site collateral effects.
- Initiate enhanced payload/collateral effects technology demonstration.
- Counter Proliferation Strategy Development (950)
- Continue proliferation path model development.

Work Performed By: Science Applications International Corporation, San Diego, CA; Logicon R&D Associates, Alexandria, VA; Oak Ridge National Laboratory, Tennessee, TN; Waterways Experiment Station, Vicksburg, MS; Wright Laboratories, Eglin AFB.

Related Activities: None.

Other Appropriation Funds: None.

International Cooperative Agreements: Non-Proliferation Treaty, Treaty on Open Skies, Chemical Weapons Convention, and Threshold Test Ban Treaty Protocol, the 17 Nunn-Lugar "umbrella agreements" and specific agreements with the Former Soviet Union.

UNCLASSIFIED

UNCLASSIFIED

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 060271SH
PE Title: Defense Nuclear Agency

Project Number: AI
Budget Activity: Exploratory Development

A. <u>RESOURCES</u>	(\$ in Thousands)	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999
<u>Project Title</u>		<u>Actual</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>
Test Site Decommissioning	0	10772	5100	4600	3000	3000	3000	3000

B. BRIEF DESCRIPTION OF PROJECT: This project provides for the orderly, long-term stabilization, security, storage preparation and decommissioning of the DNA underground nuclear test facilities at the Nevada Test Site. This project also provides for documentation of the underground test related technology to insure that there is an adequate knowledge base to safely and securely reactivate the underground testbed, if requested by the President.

C. PROGRAM ACCOMPLISHMENT AND PLANS:

FY 1993 Accomplishments:

- Project Initiated in FY 1994.

FY 1994 Plans:

- Close all but one tunnel complex. (1248)
- Continue documentation of UGR technical data and assets to preserve technical knowledge and permit the use of the existing assets in other DoD Programs. (980)
- Continue operations and maintenance for Nevada Test Site while reducing manning to a total of 7 DNA individuals. (3005)
- Complete distribution of construction and operational assets to other DoD Programs. (860)
- Complete transfer of appropriate UGR technologies to other government programs. (4679)
- Continue operations and maintenance and closure activities of two more tunnel complexes. (4100)
- Continue documentation efforts. (1000)

Work Performed By: Lockheed Missile & Space Corporation, Sunnyvale, CA and Huntsville, AL; Science Applications International, Inc., San Diego, CA; EG&G Energy Measurements, Inc., Las Vegas, NV; S-Cubed, La Jolla, CA; Raytheon Services Nevada, Las Vegas, NV; Terra Tek, Salt Lake City, UT; Johnson Controls World Services, Las Vegas, NV; Allied Systems Technical Services (Bendix), Las Vegas, NV; Pac Tech, Claremont, CA; Tech Reps, Albuquerque, NM; REECO, Las Vegas, NV; Sandia National Laboratory, Albuquerque, NM; Department of Energy, Nevada Operations Office, Las Vegas, NV; Lawrence Livermore National Laboratory, Livermore, CA and Los Alamos National Laboratory, Los Alamos, NM.

Related Activities: All of the activities at NTS are coordinated with the Department of Energy at the Nevada Test Site. There is no duplication.

Other Appropriated Funds: None.

International Cooperative Agreements: None.

UNCLASSIFIED

UNCLASSIFIED

FY 1995 ROTTE DESCRIPTIVE SUMMARY

Program Element: 0602715H
PE Title: Defense Nuclear AgencyProject Number: AY
Budget Activity: Exploratory DevelopmentA. RESOURCES (\$ in Thousands)

Project Title	FY 1993 Actual	FY 1994 Actual	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate
Bioenvironmental Hazards Research	2910	4000	0	0	0	0	0

B. BRIEF DESCRIPTION OF PROJECT: This project provides for bioenvironmental hazards research activities to enable DoD to strengthen its efforts in developing technologies to protect DoD personnel, the civilian population and the environment from potential hazardous substances DoD generates and uses. Funds were provided as a Congressional addition to the FY 1993 President's Budget Submission and are intended to continue efforts begun by a grant in FY 1989 to Tulane and Xavier Universities.C. PROGRAM ACCOMPLISHMENT AND PLANS:

FY 1993 Accomplishments (by Tulane and Xavier):

- Conducted research in the following areas related to bioenvironmental hazards of interest to DoD: genotoxicity, composting of munitions contaminated soil, treatment of waste water, contamination detection, and development of alternatives to hazardous chemicals.

FY 1994 Plans:

- Apply research results to mitigate high priority defense-related bioenvironmental hazards.

Work Performed By: Tulane University, New Orleans, LA; Xavier University, New Orleans, LA.

Related Activities: None.Other Appropriation Funds: None.International Cooperation Agreements: None.**UNCLASSIFIED**

UNCLASSIFIED

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 0602715H
PE Title: Defense Nuclear Agency

Project Number: AZ
Budget Activity: Exploratory Development

<u>A. RESOURCES</u> (\$ in Thousands)		FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999
<u>Project</u>	<u>Title</u>	<u>Actual</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>
Los Alamos National Lab.	Meson Physics Facility	0	0	0	0	0	0	0
		14550	0	0	0	0	0	0

B. BRIEF DESCRIPTION OF PROJECT: This project provides for the upgrade of the Los Alamos National Laboratory Meson Physics Facility (LAMPF), significantly enhancing the capabilities for DoD and other applications requiring a medium-energy, high current accelerator. Funds were provided as a Congressional addition to the FY 1993 President's Budget Submission.

C. PROGRAM ACCOMPLISHMENT AND PLANS:

FY 1993 Accomplishments (by LANL):

- Designed and fabricated an acceleration test stand called the Accelerator Performance Demonstration Facility and performed a comprehensive evaluation of the additional changes that would be needed to increase the average current and beam power of the LAMPF accelerator by up to a factor of 10.
- Conducted a feasibility study using LAMPF as part of an Integrated Test Facility for testing and evaluating the technologies required for the accelerator based conversion (transmutation) of surplus plutonium and radioactive waste products.
- Conducted a pre-conceptual design study of a facility extension at LAMPF that would produce intense, narrow bursts of neutrons and gammas for DoD testing programs.

Work Performed By: Los Alamos National Laboratory, Albuquerque, NM.

Related Activities: None.

Other Appropriation Funds: None.

International Cooperative Agreements: None.

UNCLASSIFIED

UNCLASSIFIED

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 0602790H
PE Title: Small Business Innovative Research

Budget Activity: Exploratory Development
Date: February 1994

A. RESOURCES: (\$ in Thousands)		FY 1995	FY 1996	FY 1997	FY 1998	FY 1999
Project Title	Actual Estimate	Estimate	Estimate	Estimate	Estimate	Estimate
Small Business Innovative Research	0	0	0	0	0	0

B. BRIEF DESCRIPTION OF ELEMENT: This program element was intended to consolidate resources that support the Small Business Innovative Research Program required by Public Law 102-564. The effort to specifically identify the SBIR program was rejected in the FY 1994 Defense Appropriation and is displayed in FY 1993 for budget presentation and consistency with the FY 1993 column of the FY 1994 President's Budget. The program is intended to stimulate technological innovation in the private sector, strengthen the role of small business in meeting DoD research and development needs, foster and encourage participation of minority and disadvantaged business in technological innovation, and increase the commercial application of DOD supported research and development results.

C. JUSTIFICATION FOR PROJECT:

FY 1993 Accomplishments:

- Supported the Small Business Administration (SBA) National Directive by actively seeking small business contractors to perform innovative nuclear weapons effects research.
- Continue active support of the SBA National Directive.

Work Performed By: Physitron, Inc., Huntsville, AL; Geo-Centers, Inc., Westwood, MA; Ares Corp., Arlington, VA; General Sciences, Inc., Morris, PA; Science & Engineering Assoc., Albuquerque, NM; Orion International Technologies, Albuquerque, NM; Carpenter Research Corp., Rolling Hill Estates, CA; Aptek, Inc., Colorado Springs, CO; Rtech Corp., Albuquerque, NM; Dese Research, Inc., Huntsville, AL; Anro Engineering Consultants, Inc., Bedford, MA; System Control Inc., Palo Alto, CA; Tetra Corp., Albuquerque, NM; Science Research Lab, Inc., Somerville, MA; ENSCO, Inc., Springfield, VA; Mission Research Corp., Santa Barbara, CA; Hy-Tech Research Corp., Redford, VA; Electro-Optek, Torrance, CA; Berkeley Research Assoc., Berkeley, CA; EIC Laboratories, Inc., Norwood, MA; North Star Research Corp., Albuquerque, NM; Optron Systems, Inc., Bedford, MA; D.H. Valles Assoc., Albuquerque, NM; Ibis Technology Corp., Danvers, MA; and UTD, Inc., Alexandria, VA.

Related Activities: None.

Other Appropriation Funds: None.

International Cooperation Agreements: None.

UNCLASSIFIED

UNCLASSIFIED

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 060371H
 PE Title: Verification Technology Demonstration

Budget Activity: Advanced Development
 Date: February 1994

A. RESOURCES: (\$ in Thousands)

Project Number & Title	FY93 Actual	FY94 Estimate	FY95 Actual	FY95 Estimate	FY96 Actual	FY96 Estimate	FY97 Actual	FY97 Estimate	FY98 Actual	FY98 Estimate	FY99 Actual	FY99 Estimate	Total Program
CA Strategic Arms Control Technology	9531	11880	13250	13363	13363	14092	14065	14065	13867	13867	13867	13867	Continuing
CB Conventional Arms Control Technology	14888	10061	10213	9187	9187	9092	8730	8730	9188	9188	9188	9188	Continuing
CC Chemical Weapons Convention Technology	21604	18955	17600	12613	12613	9625	10975	10975	12434	12434	12434	12434	Continuing
CD Yield Measurement Technology	9112	0	0	0	0	0	0	0	0	0	0	0	
CE Cooperative Threat Reduction	12157	0	0	0	0	0	0	0	0	0	0	0	
TOTAL	67292	40896	41063	35163	35163	32809	33770	33770	35489	35489	35489	35489	

B. BRIEF DESCRIPTION OF ELEMENT: This program element covers verification and compliance RDT&E for arms control treaties including Treaty on the Reduction and Limitation of Strategic Offensive Arms (START), the Treaty on Further Reduction and Limitation of Strategic Offensive Arms (START II), Conventional Armed Forces in Europe (CFE), Comprehensive Test Ban Treaty (CTBT), Non Proliferation Treaty, Chemical Weapons Convention (CWC), Open Skies, Presidential arms control initiatives, other existing and emerging arms control related agreements, treaties, and initiatives, such as the Conference on Security and Cooperation in Europe and the Cooperative Threat Reduction (CTR) Program.

The program includes development of hardware and techniques for on-site inspections in treaty nations and for use on the Open Skies Aircraft and ground systems, and assists the Office of the Secretary of Defense in preparing for U.S. compliance with treaty provisions. Hardware and procedures developed are transitioned to the On-Site Inspection Agency (OSIA) (or appropriate international inspectorate, such as in the case of CWC) for use in conducting inspections or overflights as required by current and future arms control treaties, agreements, or other agreed transparency and confidence building regimes.

Where applicable, RDT&E to meet one requirement is applied to other areas, eliminating duplicative efforts and maximizing synergistic results. For example, acoustic resonance spectroscopy (ARS) technology and hardware developed under the CWC technology program were evaluated for possible use under the START treaty to identify treaty accountable systems. In another example, the totality of work accomplished by the DNA arms control technology program was an invaluable source of information on equipment and procedures that were extensively used by DNA in supporting an interagency assessment of Long Term Monitoring capability in Iraq. These results were briefed to the UN Special Commission (UNSCOM) on Iraq and will be used to implement the provisions of United Nations Resolution 715.

UNCLASSIFIED

UNCLASSIFIED

Another example of the broad nature of the DNA effort is reflected by the data management development effort. Arms Control treaties require extensive exchanges of data describing treaty accountable items, initial declarations, movements, etc., of signatory nations. DNA has developed an information management system, the Compliance Monitoring Tracking System (CMTS), to accommodate these data exchanges and monitor U.S. compliance with treaty provisions. Currently CMTS can provide treaty required data exchanges for Intermediate-Range Nuclear Forces (INF), START, CFE and Confidence and Security Building Measures. Work is underway to define START II Central Data System requirements. The Open Skies Notification System is being developed to support a Sep 94 entry-into-force (EIF). At completion, DNA will turn over operation of CMRS to OSIA. The Chemical Weapons Convention Information Management System demonstration model is being reviewed by the U.S. Interagency Group to determine whether it will be provided to the International Organization at the Hague.

Beginning with an agreement signed between Presidents Bush and Yeltsin on 17 June 1992, and subsequent other umbrella and implementing agreements, the US Government is providing assistance to the Former Soviet Union in the safe, secure, dismantlement of nuclear and other weapons of mass destruction. Under the authorizations provided by the Nunn-Lugar Act, \$12,157K of FY 1993 RDT&E funds has been transferred to DNA by the OSD Comptroller to support the execution of the agreed-to projects.

Verification Technology Demonstration, Program Element Number 060371H is appropriately categorized as Advanced Development (6.3) because the technologies are typically available and state-of-the-art items are integrated to address specific treaty verification requirements. Further, proof-of-principle of integrated equipment and performance evaluation tests are performed to establish optimum configurations to support the Treaty requirements and field demonstrations of integrated systems in projected operational scenarios are conducted to define potential upgrade and define operational and maintenance requirements for expected fielded end-items.

UNCLASSIFIED

UNCLASSIFIED

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 0603711H
PE Title: Verification Technology Demonstration

Project Number: CA
Budget Activity: Advanced Development

A. RESOURCES: (\$ in Thousands)

Project Title	FY93 <u>Actual</u>	FY94 <u>Estimate</u>	FY95 <u>Estimate</u>	FY96 <u>Estimate</u>	FY97 <u>Estimate</u>	FY98 <u>Estimate</u>	FY99 <u>Estimate</u>	Total <u>Program</u>
Strategic Arms Control Technology	9531	11080	13250	13361	14092	14065	13867	Continuing

B. BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEMS CAPABILITIES: This project consists of RDT&E activities required to implement U.S. rights under the Treaty on the Reduction and Limitation of Strategic Offensive Arms (START) and the Treaty on the Further Reduction and Limitation of Strategic Offensive Arms (START II), to assist U.S. manufacturers with knowledge and understanding of the treaties to ensure they are in compliance, and to develop technology which will meet requirements of future nuclear arms control agreements. Treaty on-site inspection requirements resulted in a Portal and Perimeter Continuous Monitoring Systems (PPCMS) which is expected to be deployed in the Ukraine after the START Treaty-Entry-Into-Force (EIF) by March 1994. A START Central Data System (SCDS), as part of the Compliance and Monitoring Tracking System (CMTS) is ready for use to enable the U.S. to make treaty required notifications and compliance assessments. The START II treaty, signed in January 1993, requires inspections of converted SS-18 silos and authorizes additional reentry vehicle on-site inspections of down-loaded ballistic missiles. Equipment has been developed and tested to accurately measure the sites, and capabilities are being developed to improve re-entry vehicle (RV) on-site inspection abilities. In addition, procedures to accommodate inspections at U.S. rocket motor production facilities were developed and demonstrated. Technology development efforts are planned to satisfy future treaty requirements in the most non-intrusive and cost-effective manner. The primary focuses of the efforts are on more effective methods of counting nuclear warheads *in situ*, measuring characteristic Treaty Limited Item (TLI) signatures using such technologies as the gravity gradiometer, and providing monitoring/inspection capabilities at lower cost.

C. PROGRAM ACCOMPLISHMENTS AND PLANS:

FY 1993 Accomplishments:

Implementation and Compliance

- Continued to work on the START Central Data System to be used when the Treaty enters-into-force, and initiated development of a START II system.
- Developed and tested a means to accurately measure the depth of converted SS-18 silos.
- Completed an analysis of methods to determine the integrity of the five-meter concrete plug installed in each converted SS-18 silo.
- Provided technical and engineering support to OSD (SAC&C).
- Revised Planning aids to update manufacturers on arms control inspection requirements.
- Conducted studies to determine the economic value of rocket fuel.

UNCLASSIFIED

UNCLASSIFIED

Technical Assessments

- Initiated actions to transition the Technical On-Site Inspection (TOSI) facility for use as a testbed for Arms Control Technology (TACT).

Improvements

- Completed the Adjunct Monitoring Study and initiated development of a "corralling" system, the key recommendation of the study.

Technology Development

- Completed the RV On-Site Inspection Study and initiated efforts to determine if RVs can be counted without opening a submarine missile tube hatch.
- Continued development of gravity gradiometer systems for use in discriminating between nuclear and non-nuclear warheads.
- Continued advanced research efforts to develop monitoring and inspection tools.
- Completed and documented work on tagging and portable weighing systems.
- Completed testing and evaluations to determine if bubble dosimeters could be used to detect radiation emitted from nuclear weapons.
- Completed the Innovative Treaty Sensor Integration Project (ITSIP) which analyzes the output from various sensors.
- Conducted testing and evaluation of radiation detection equipment to determine if START requirements could be met with off-the-shelf technologies.

FY 1994 Plans:

Implementation and Compliance (5367)

- Enhance SCDS by installing the Red Memorandum of Understanding and fulfilling START II requirements.
- Finalize Procedures for SS-18 Silo measurement equipment and support Bilateral Implementation Commission discussions on equipment use.
- Conduct Special-Access Visit (SAV) exercise and revise preparation procedures.
- Develop options to accelerate the Russian draw-down schedule.
- Provide support to START and START II Treaty compliance and implementation commissions.
- Provide technical and engineering support to OSD (SAC&C).
- Conduct cost analysis of selected programs and provide in depth technical analysis as directed by OSD (SAC&C).

Technical Assessments (1096)

- Fully develop TACT and install infrastructure systems.

Improvements (2499)

- Continue development of the adjunct monitoring "corralling" concept by preparing "A" and "B" specifications.

Technology Development (2918)

- Conduct modeling to determine the potential of verifying the number of RVs on a Submarine-Launched Ballistic Missile (SLBM) without opening the launch tube hatch.
- Continue efforts on gravity gradiometer development and demonstration.
- Begin development of remotely interrogatable tags and seals, the authenticated tracking and monitoring system, and smart video.
- Begin national laboratory cooperative teaming and quick response support.

UNCLASSIFIED

UNCLASSIFIED

FY 1995 Plans:

- Implementation and Compliance (6053)
- Complete SCDS development, transfer to a windows operating environment, and document the system.
- Develop methods to assist nations of the former Soviet Union to control critical missile component proliferation.
- Conduct a (SAV) exercise and update preparation procedures.
- Initiate development of an acquisition integration and dissemination system to assist in compilation and analysis of arms control and related information.
- Continue support to treaty implementation and compliance commissions.
- Continue to provide technical and engineering support to OSD (SAC&CI).
- Continue efforts to develop improved Solid Rocket Motor (SRM) demilitarization capabilities.
- Conduct cost analyses of selected projects.

Technical Assessments (1113)

- Continue to maintain and improve the TACT, and support testing and evaluation efforts.

Improvements (2227)

- Continue development of the adjunct monitoring/corraling system and produce a "C" specification.
- Begin development of new RVOSI equipment.
- Test and demonstrate a gravity gradiometer designed for arms control applications.
- Continue development and testing of remotely interrogatable tags/seals, authenticated tracking and monitoring systems, and the smart video.
- Continue national laboratory cooperative teaming and quick response support efforts.

D. WORK PERFORMED BY: Sandia National Laboratory, Albuquerque, NM; Los Alamos National Laboratory, Los Alamos, NM; Institute for Defense Analyses, Alexandria, VA; Raytheon Service Co., Burlington, MA; Science Application International Corp., McLean, VA; BDM, Albuquerque, NM and McLean, VA; Systems Planning Corporation, Arlington, VA; Meridian Corp., Alexandria, VA; MITRE, Burlington, MA; Waterways Experimentation Station, Army Corps of Engineers, Vicksburg, MS; Electronic Systems Center, Hanscom AFB, MA; Analytic Sciences Corporation, Arlington, VA; and the US Naval Academy, Annapolis, MD.

E. COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY: No significant change.

F. PROGRAM DOCUMENTATION: DNA conducts RDT&E programs for cooperative inspection technologies related to arms control treaty verification; requirements are provided by the DoD treaty manager and are reflected in the OSD Master Plan.

G. RELATED ACTIVITIES: None.

H. OTHER APPROPRIATION FUNDS: None.

I. INTERNATIONAL COOPERATIVE AGREEMENTS: START and Follow-on Treaties.

UNCLASSIFIED

UNCLASSIFIED

J.

<u>MILESTONE SCHEDULE:</u>	
- START Treaty to Senate:	25 Nov 91
- Senate Vote:	01 Oct 92
- START II Treaty signed:	03 Jan 93
- START II to Senate:	TDB
- START EIF:	2nd Qtr FY94
- START II Entry-Into-Force:	Jan-Jun FY94
- START Baseline Inspections Begin:	3rd Qtr FY94
- PPCMS Deployment Begins:	3rd Qtr FY94
- START Special Access Visits Begin:	1st Qtr FY95

UNCLASSIFIED

UNCLASSIFIED

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 0603711H
 PE Title: Verification Technology Demonstration
 A. RESOURCES: (\$ in Thousands)

<u>Project Title</u>	<u>FY93 Actual</u>	<u>FY94 Estimate</u>	<u>FY95 Estimate</u>	<u>FY96 Estimate</u>	<u>FY97 Estimate</u>	<u>FY98 Estimate</u>	<u>FY99 Estimate</u>	<u>Total Program</u>
Conventional Arms Control Technology	10061	10213	9187	9092	8730	9188	9188	Continuing
(CFE Aerial Inspection/Open Skies)	(10019)	(6645)	(4503)	(4466)	(4359)	(4385)		

B. BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEMS CAPABILITIES: This project covers RDT&E required to meet inspections, transparency and confidence building technology requirements, ensure compliance, and implement existing, emerging, and potential treaties, agreements, and initiatives related to conventional arms control (CAC). Relevant agreements which require continuing RDT&E support include: (1) the Conventional Forces in Europe (CFE) Treaty, ratified by the U.S. in December 1991 (and its follow-on, CFE-IA, signed by the member states in 1992), and entered into force July 1992; (2) the Treaty on Open Skies signed by the member states March 1992 and ratified by the U.S. in August 1993 (projected Entry-Into-Force September 1994); and (3) the Agreement on Confidence and Security Building Measures (CSBMs), signed November 1990 and revised in 1992. A third revision is expected in December 1994. The emerging treaty and agreement areas requiring RDT&E support include: (1) the Conference on Security and Cooperation in Europe (CSCE) Review Conferences, with its CSCE Forum for Security Cooperation; (2) regional/sub-regional peacekeeping (including ethnic and national conflict) and conventional arms control and proliferation issues; (3) enhancing Confidence and Security Building Measures; and (4) United Nations initiatives related to Transparency In Armaments (TIA) reporting. This project develops hardware and techniques to support on-site and other inspection modes, Open Skies overflights, and provides technology and aids for U.S. compliance, e.g., a supporting management information system for treaty required data exchanges - the Data Management/Notification System (DMNS) and Open Skies Notification System (OSNS) (both part of the Compliance Monitoring Tracking System (CMTS)).

C. PROGRAM ACCOMPLISHMENTS AND PLANS:

FY 1993 Accomplishments:

Implementation and Compliance

- Integrated CSBM reporting; began transition of central host node to UNIX operating system.
- Continued Open Skies Synthetic Aperture Radar (SAR) development; delivered Beta version of Open Skies Management and Planning System (OSMAPS); continued vulnerabilities modeling; and identified and executed OS unique compliance and implementation technology RDT&E requirements.
- Provided technical support (to include on-site support) to Open Skies Consultative Committee (OSCC) and its Sensors Working Group.
- Modified CMRS to meet Open Skies Notification System (OSNS) requirements.
- Provided technical and engineering support to Office of the Secretary of Defense/Conventional Arms Control and Compliance (OSD/CAC&C).

UNCLASSIFIED

UNCLASSIFIED

Technology Assessments

- Identified RDT&E requirements related to emerging and potential regional/subregional CAC regimes, including the Middle East and Northeast Asia.
- Improvements
 - Analyzed available, and recommended appropriate, follow-on sensors for potential integration with Open Skies observation platforms.
 - Assessed enhanced technologies for upgrading treaty regimes; completed assessments of Passive Millimeter Wave Imaging (PMWI) and Hyperspectral Imaging and Data Exploitation (HIDE).
 - Performed infrared line scanner flight test activities and delivered imagery to support Open Skies implementation efforts.
 - Initiated RDT&E on Open Skies media archiving and processing needs.

FY 1994 Plans:

- Implementation and Compliance (4328)
 - Continue to modify CMTS to meet Open Skies Notification System (OSNS) requirements.
 - Continue development of first prototype SAR for installation on Open Skies aircraft and initiate development of prototype portable SAR processing system and overall SAR processing system architecture.
 - Continue refinement of OSNAPS capability to optimize Open Skies mission planning, overflight notification and vulnerabilities assessment capability.
 - Provide technical and engineering support to OSD/CAC&C.
- Technology Assessments (1166)
 - Update Middle East regional assessment, deliver India-Pakistan technical assessment and recommendation on safehavens/barriers technologies and approach.
 - Deliver technical assessment of inspection synergies at locations vulnerable to both notified and On-site challenge inspections, as well as Open Skies overflights.
- Improvements (3796)
 - Complete UNIX transition and move central host node to OSIA, and initiate efforts to develop architecture for integration of various data sources.
 - Support US delegation to Open Skies Consultative Commission by evaluating and determining RDT&E requirements for allowed upgrades, enhancements, and improvements to current Open Skies sensors, assess multi-use sensors for Environmental, Nuclear, Chemical and Biological sensing as well for crisis stability and crisis intervention overflights.

Technology Development (771)

- Determine RDT&E required to ensure U.S. ability to implement and comply in a cost-effective manner with opportunities to increase stability through emerging CAC regimes, such as regional arms control and peacekeeping initiatives, related to ethnic and national conflicts to include potential Balkan's arms control discussions.

FY 1995 Plans:

- Implementation and Compliance (1079)
 - Initiate RDT&E for technologies to support creation or maintenance of safe havens and barriers for peacekeeping and security regimes.
 - Deliver prototype SAR, SAR image processing systems, and SAR processing system architecture.
 - Provide technical and engineering support to OSD/CAC&C.
- Technology and Assessments (1200)

UNCLASSIFIED

UNCLASSIFIED

- Determine new technology RDT&E requirements related to ensuring U.S. ability to implement and comply with provisions of existing, emerging, and potential CAC regimes including the verification of the spread of advanced conventional weapons.
- Improvements (5440)
 - Continue to develop and pursue technologies/techniques to meet identified data integration, correlation, interpretation, and extrapolation requirements associated with existing and emerging CAC or transparency and confidence-building regimes. Support OSCC.
 - Provide CMTS/DMNS developmental hardware/software support; complete OSNS modification for Open Skies reporting requirements and transition to OSIA. Provide software documentation.
- Technology Development (1694)
 - Define requirements for analytical tools to provide U.S. Government with capabilities for analysis within or across existing treaty-related databases.
 - Continue to develop and pursue technologies/techniques to meet identified data integration, correlation, interpretation, and extrapolation requirements associated with existing and emerging CAC or transparency and confidence-building regimes.

D. WORK PERFORMED BY: Institute for Defense Analysis, Alexandria, VA; BDM, McLean, VA; System Planning Corp.; Alexandria, VA; Argonne National Laboratory, Argonne, IL; Northrop Corp., Pico Rivera, CA; Sandia National Laboratory, Albuquerque, NM; Science Applications International Corporation, McLean, VA; Jaycor, Vienna, VA; Meridian Corporation, Alexandria, VA; and National Security Planning Associates, Washington, DC.

E. COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY: There is no fundamental change from the FY94 descriptive summary. Programs continue to emphasize RDT&E efforts in support of Open Skies, CSBM's and CFE DMNS as well as Open Skies notifications. There is some increase in emphasis on pro-active assessments of potential regional verification RDT&E needs related to ethnic and national conflict.

F. PROGRAM DOCUMENTATION: Requirements are developed in conjunction with the Conventional Arms Control and Compliance Directorate, OSD (ACT) and OSD (P). Efforts affecting several treaties are coordinated through the Forum on Arms Control Technology. Programs are listed and described in the FY94-95 Program Plan for RDT&E for Arms Control through Cooperative Inspection.

G. RELATED ACTIVITIES: None.

H. OTHER APPROPRIATION FUNDS: None.

I. INTERNATIONAL COOPERATIVE AGREEMENTS: CFE Treaty signed 19 Nov 90, ratified Dec 91, entered into force 17 Jul 92; Confidence and Security Building Measures Agreement signed 19 Nov 90, expanded and modified in the Vienna Document 92, signed 29 Feb 92 and entered into force 1 May 92; the Treaty on Open Skies, signed 24 Mar 92 and ratified August 1993, EIF anticipated in September 1994.

J.

MILESTONE SCHEDULE:

- CFE Treaty ratified by U.S.: Dec 91
- Vienna Document 92 Signature: Feb 92
- CSCG Review Conference begins: Mar 92
- Treaty on Open Skies Signature: Mar 92
- Vienna Document 92 (CSBM's) Entry-Into-Force: May 92

UNCLASSIFIED

UNCLASSIFIED

- CFE/CFE IA Treaty Entry-Into-Force:
- Initial CFE data exchange:
- Forum for Security Cooperation (FSC) begins meeting:
- Initial annual CFE data exchange update:
- Initial TIA information submission:
- Open Skies Treaty ratified by U.S.:
- Open Skies Entry-Into-Force:
- CSCE Review Conference Begins:
- CSCE Summit:
- Vienna Document 94 signature:
- Open Skies Flights begin:
- Vienna Document 94 (CSBM's) Entry-Into-Force:
- TIA review:
- CFE Eliminations/Reduction Period Complete:
- Follow-on Open Skies aircraft with full sensor suite of Treaty-permitted sensors operational:

Jul 92	Aug 92
Aug 92	Sep 92
Sep 92	Jan 93
Jan 93	Apr 93
Apr 93	Aug 93
Aug 93	Sep 94
Sep 94	Oct 94
Oct 94	Dec 94
Dec 94	Dec 94
Dec 94	Jan 95
Jan 95	Mar 95
Mar 95	Jul 95
Jul 95	Nov 95
Nov 95	Jan 96

UNCLASSIFIED

UNCLASSIFIED

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 0603711H
PE Title: Verification Technology Demonstration

Project Number: CC
Budget Activity: Advanced Development

A. RESOURCES: (\$ in Thousands)

<u>Project Title</u>	<u>FY93 Actual</u>	<u>FY94 Estimate</u>	<u>FY95 Actual</u>	<u>FY95 Estimate</u>	<u>FY96 Actual</u>	<u>FY96 Estimate</u>	<u>FY97 Estimate</u>	<u>FY98 Estimate</u>	<u>FY99 Estimate</u>	<u>Total Program</u>
Chemical/Biological Weapons Agreements Technology	21604	18955	17600	12613	9625	10975	12434	12434	12434	Continuing

B. BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEMS CAPABILITIES: This project conducts RDT&E required for multinational verification and U.S. compliance with the Convention on the Prohibition of the Development, Production, Stockpiling, and Use of Chemical Weapons and on Their Destruction (CWC) and other emerging chemical/biological weapons agreements. It includes development of means to facilitate implementation of treaty provisions, primarily through conduct of on-site inspections and U.S. Planning for compliance activities. The project also performs technology assessments, test and evaluation, impacts analysis, and implementation plans.

C. PROGRAM ACCOMPLISHMENTS AND PLANS:

FY 1993 Accomplishments:

Implementation and Compliance

- Completed development of the prototype International CWC Information Management System.
- Completed prototype development of selected non-destructive evaluation (NDE) systems.
- Continued development of an integrated training program and conducted pilot course for CWC inspectors.
- Continued development of a prototype hand-held gas chromatograph chemical detector.
- Continued independent test and evaluation of recommended inspection equipment and procedures.
- Identified technology gaps during the test and evaluation of baseline verification inspection systems.
- Continued to evaluate emerging sampling and analytical technologies.
- Continued development of enhanced verification inspection systems.
- Provided technical support to U.S. compliance and implementation planning efforts.
- Began development of a system to enhance managed access of sensitive areas during challenge inspections.
- Completed development of a methodology for assessing the adequacy of facility destruction verification measures.
- Began transition of baseline equipment and procedures to the Preparatory Commission and the Provisional Technical Secretariat.
- Examined CWC Inspector qualifications and legal and environmental aspects of the verification regime.
- Identified observable characteristics that are indicators of prohibited chemical weapons activities.
- Examined inspection methods/procedures and ways non-compliant states might circumvent them.
- Technology Development
 - Developed concept and prototype design for a munitions full verification system for allegation-of-use investigations.
 - Began evaluation of new technologies for future NDE applications.

UNCLASSIFIED

UNCLASSIFIED

- Evaluated potential application of large-volume air sampling technology for enhanced treaty verification.

FY 1994 Plans:

- Implementation and Compliance (15225)
 - Complete development of enhanced non-destructive evaluation systems.
 - Complete prototype development and engineering development of the hand-held gas chromatograph chemical detector.
 - Complete development of a methodology for assessing the adequacy of facility destruction verification measures.
 - Complete design and prototype development for managed access system for CWC Inspections.
 - Complete development of an integrated training program and conduct supplemental pilot course for CWC Inspectors.
 - Continue independent test and evaluation of recommended inspection equipment and procedures.
 - Develop prototype munitions fill verification system for allegation-of-use investigations.
 - Continue to identify technology gaps during the test and evaluation of baseline verification inspection systems.
 - Continue to evaluate emerging sampling and analytical technologies.
 - Continue to develop enhanced verification inspection systems.
 - Continue to provide technical support to the U.S. representative to the CWC Preparatory Commission.
 - Continue to provide technical support to U.S. compliance and implementation planning efforts.
 - Continue transition of baseline equipment and procedures to the Preparatory Commission and the Provisional Technical Secretariat.
 - Continue development of the definitive international CWC Information Management System from the prototype.
 - Begin development of a national CWC Information Management and Reporting System.
 - Assess legal, political, environmental and resource implications for U.S. CWC implementation.
 - Continue identifying observable characteristics that are indicators of prohibited chemical weapons activities.
 - Begin defining requirements for a data/information processing, analysis, and fusion methodology for supporting objectives of the CWC.
 - Develop methodology to evaluate proposed Biological Warfare Convention (BWC) monitoring regimes.
 - Technology Development (800)
 - Continue evaluation of promising technologies for future NDE applications.
 - Continue evaluating potential application of large-volume air sampling technology for enhancing treaty verification.

FY 1995 Plans:

- Implementation and Compliance (12741)
 - Complete development of the definitive international CWC Information Management System.
 - Continue independent test and evaluation of recommended inspection equipment and procedures.
 - Continue to identify technology gaps during the test and evaluation of baseline verification inspection systems.
 - Continue to evaluate emerging sampling and analytical technologies as they become available.
 - Continue to develop enhanced verification inspection systems.
 - Continue to provide technical support to the U.S. representative to the CWC Preparatory Commission.
 - Continue to provide technical support to U.S. compliance and implementation planning efforts.

UNCLASSIFIED

UNCLASSIFIED

- Complete transition of baseline equipment and procedures to the Preparatory Commission and the Provisional Technical Secretariat.
- Complete development of a national CWC Information Management and Reporting System.
- Support Preparation for execution of the CWC inspector training program.
- Technical Assessments (2525)
- Evaluate proposed monitoring measures to deter BWC noncompliance.
- Complete development of prototype system to analyze data/information to be acquired by the Technical Secretariat.

Improvements (11534)

- Develop technologies to improve verification regimes of treaties in force.
- Technology Development (800)
 - Continue evaluation of promising technologies for future NDE applications.
 - Continue test and evaluation of selected subsystems or components of potential large-volume air sampling systems; develop prototype designs.

D. WORK PERFORMED BY: US Army Edgewood Research, Development and Engineering Center, Aberdeen Proving Grounds, MD; US Army Dugway Proving Ground, Dugway, UT; US Army Chemical School, Anniston, AL; Lawrence Livermore National Laboratory, Oakdale, CA; Air Force Technical Applications Center, Patrick AFB, FL; Los Alamos National Laboratories, Los Alamos, NM; Brookhaven National Laboratory, Upton NY; BDM International, Inc., McLean, VA; System Planning Corporation, Arlington, VA; Battelle Memorial Institute, Columbus, OH; Science Applications International Corporation, Newington, VA; and General Research Corporation, Santa Barbara, CA;

E. COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY: Project has been expanded to reflect RDTE to assess technologies and measures applicable to the Biological Weapons Convention (BWC).

F. PROGRAM DOCUMENTATION: The key document is the Convention on the Prohibition of the Development, Production, Stockpiling, and Use of Chemical Weapons and on Their Destruction. Requirements are also delineated by the treaty manager, in the Office of Assistant to the Secretary of Defense (Atomic Energy), OATSD(AE), and the Office of the Under Secretary of Defense (Policy) OUSD(P). Programs are reflected in the OSD Master Plan.

G. RELATED ACTIVITIES: Work is being conducted as part of the Chemical Stockpile Disposal Program by the US Army Chemical Material Destruction Agency to meet a Congressionally mandated requirement for destruction of the US chemical weapons stockpile. Also, compliance planning and implementation efforts related to the US/Russian bilateral agreements and the CWC are being conducted by the Services with coordination provided by OATSD(AE).

H. OTHER APPROPRIATED FUNDS: None.

I. INTERNATIONAL COOPERATIVE AGREEMENTS: The Convention on the Prohibition of the Development, Production, Stockpiling, and Use of Chemical Weapons and on Their Destruction, signed 13 Jan 1993; the US/USSR Memorandum of Understanding signed at Jackson Hole, WY, 23 Sep 89; the US/USSR CW Destruction Agreement, signed June 1990; The Convention on the Prohibition of the Development, Production and Stockpiling of

UNCLASSIFIED

UNCLASSIFIED

Bacteriological (Biological) and Toxin Weapons and on Their Destruction, signed 10 Apr 1972; and the US/UK/Canada Memorandum of Understanding on the Cooperative Program on Research, Development, Production, and Procurement of Chemical and Biological Defense Material, ITF-11 Technologies for CWC Verification signed Mar 90.

J.

MILESTONE SCHEDULE:

- CWC Signed	Jan 93
- Preparatory Commission Established	Feb 93
- CWC to Senate	Nov 93
- CWC Entry-Into-Force	Jan 95
- BWC Review Conference	1996

UNCLASSIFIED

UNCLASSIFIED

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 0603711HPE Title: Verification Technology DemonstrationProject Number: CD
Budget Activity: Advanced DevelopmentA. RESOURCES: (\$ in Thousands)

Project Title	FY93 <u>Actual</u>	FY94 <u>Actual</u>	FY95 <u>Estimate</u>	FY96 <u>Estimate</u>	FY97 <u>Estimate</u>	FY98 <u>Estimate</u>	FY99 <u>Estimate</u>	Total Program
Yield Measurement Technology	9112	0	0	0	0	0	0	9112

B. BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEMS CAPABILITIES: Yield Measurement Technology provided the technical and operational capability to field the HYDROPLUS measurement package on underground nuclear tests in Russia to verify yield compliance in non-standard test geometries in accordance with Threshold Test, Ban Treaty protocols. The technology program included all necessary instrumentation and gauge construction, fielding support, data reduction, and analysis for technology validation in the U.S. and for actual yield verification operations in Russia. The program terminated at the end of fiscal year 1993.

C. PROGRAM ACCOMPLISHMENTS AND PLANS:

FY 1993 Accomplishments:

- Orderly Shutdown of the HYDROPLUS Program
- Completed review of the second draft of detailed procedures manuals for HYDROPLUS deployment, assembly, installation, surveying, coring, logging, void detection, geology evaluation, laboratory testing, and yield analysis.
- Terminated effort to develop the "production" level HYDROPLUS monitoring equipment.
- Transported and "mothballed" the prototype HYDROPLUS recording, power generation, command and monitoring, and geotechnical vans to a secure storage area.
- Completed field exercises to train HYDROPLUS designated personnel.
- Completed data analysis and documented results from the FY 1992 underground test.
- Program Planning for Tests to Support Enhanced Seismic Monitoring Techniques for Verifying Comprehensive Test Ban Treaty Verification
- Developed program that uses HYDROPLUS technology, equipment, and personnel to run well-characterized, high-explosive (HE) tests to support enhancement of the seismic monitoring technique for identifying low yield nuclear tests.
- Chose test site at White Sands Missile Range and initiated pretest activities on the Seismic Calibration Hard Rock In-Situ Test (SCHIST) that provides the first extensive near-source ground motion data base for a contained detonation to provide a refined hard rock seismic source function.

D. WORK PERFORMED BY: S-Cubed, La Jolla, CA; Science Applications International Corporation, San Diego, CA; California Research & Technology, Inc., Chatsworth, CA; Stanford Research International, Menlo Park, CA; R & D Associates, Albuquerque, NM; Allied-Signal, Las Vegas, NV.

E. COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY: No change.**UNCLASSIFIED**

UNCLASSIFIED

F. PROGRAM DOCUMENTATION:

- Threshold Test Ban Treaty Protocol
- National Security Directive

G. RELATED ACTIVITIES: Program Elements 0305135BA (OSIM, PDA, MILICON), On-Site Inspection Agency, Supporting Activities: 0305089BA (OSIM, PDA), OSIA Management Headquarters: 00305136BA (OSIM, PDA), OSIA Operations Communications: 0602714E, DARPA. There is no duplication.

H. OTHER APPROPRIATION FUNDS: None.

J.	MILESTONE SCHEDULE:	Jun 93
	- "Mothball" prototype HYDROPLUS vans in secure storage area	
	- Complete detailed procedures manuals	Dec 93
	- Conduct the high explosive (HE) SCHIST test	May 94
	- Provide SCHIST seismic source function data to ARPA and AFTAC	Dec 94

UNCLASSIFIED

UNCLASSIFIED**FY 1995 RDT&E DESCRIPTIVE SUMMARY**Program Element: 0603711HPE Title: Verification Technology DemonstrationProject Number: CE
Budget Activity: Advanced Development

<u>A. RESOURCES:</u> (\$ in Thousands)	<u>Project Title</u>	<u>FY93</u>	<u>FY94</u>	<u>FY95</u>	<u>FY96</u>	<u>FY97</u>	<u>FY98</u>	<u>FY99</u>	<u>Total Program</u>
		<u>Actual</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	
Cooperative Threat Reduction (CTR)		0	0	0	0	0	0	0	12157

B. BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEMS CAPABILITIES: In November 1991, Congress authorized funding for the U.S. to assist republics of the former Soviet Union to destroy nuclear, chemical, and other weapons; transport, store, disable, and safeguard weapons in conjunction with their destruction; and establish safeguards against proliferation. The initial legislation, Section 108 of Public Law 102-229, as amended, (also known as the Nunn-Lugar Act) authorized the transfer of up to \$400 million from DOD accounts to this program. An additional \$400 million per year was authorized under the FY 1993 & FY 1994 Defense Appropriations Acts. Previously referred to as the Nunn-Lugar Act or the Safety, Security, and Dismantlement (SSD) Program, it has been recently changed to the Cooperative Threat Reduction (CTR) Program. On 29 March 1992, the President delegated to the Secretary of Defense the authority for establishing and executing the program. The Assistant to the Secretary of Defense (Atomic Energy), ATSD(AE), was delegated management responsibility for program execution by the Secretary of Defense. On 11 January 1993, ATSD(AE) delegated to the Defense Nuclear Agency (DNA), program management execution responsibilities to include project and acquisition planning, procurement, financial management, and performance oversight.

C. PROGRAM ACCOMPLISHMENTS AND PLANS:
FY 1993 Accomplishments:
Technical Assessments

- Continued planning the International Science and Technology Center in Russia as a means of aiding the transition of Russian weapons scientists to peaceful scientific endeavors.
- Used the Arctic Nuclear Waste program to study, assess and identify nuclear waste disposal by the former Soviet Union.
- Used Export Control (Belarus) to assist in establishment of export control systems to prevent the proliferation of weapons of mass destruction.
- Conducted technical assessments to assist in defining specific CTR projects.
- Procured equipment and services in support of implementing agreements

D. WORK PERFORMED BY: Principal government agencies that will also support this effort include, but will not be limited to, the On-Site Inspection Agency (OSIA), the U.S. Army Corps of Engineers, Office of Naval Research, the Department of State, and the Department of Energy. Additional work is performed by private contractors.

E. COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY: Program has expanded to meet the requirements of new signed agreements.

UNCLASSIFIED

UNCLASSIFIED

F. PROGRAM DOCUMENTATION:

- a) 29 March 1992 Memorandum, from the President, delegating the Secretary of Defense the authority for establishing and executing a program for assistance in the safe secure destruction of nuclear and other weapons of mass destruction.
- b) House Resolution (H.R.) 3807 (Title II) as referenced in Public Law (P.L.) 102-229 (Section 108).
- c) 31 March 1992 Memorandum from USD(A), delegating the program management responsibility to OASD(AE).
- d) 11 January 1993 Memorandum, from OASD(AE), delegating program management to DNA.

G. RELATED ACTIVITIES: Freedom for Russia and Emerging Eurasian Democracies and Open Markets Support Act of 1992.

H. OTHER APPROPRIATION FUNDS: Funds made available for the CTR efforts have been provided by appropriation as applicable for tasks. Other appropriation funds (PE 3511SH) as follows:

\$000	93	94	95
(OSM)	55270	-	-
(PDA)	23385	-	-
(MILCON)	8700	-	-

I. INTERNATIONAL COOPERATIVE AGREEMENTS:

- a) 17 June 1992: Umbrella Agreement between the U.S. Government (USG) and the Russian Federation concerning the Destruction and Safeguarding of Weapons and the Prevention of Weapons Proliferation.
- b) 17 June 1992: Agreement between Department of Defense (DoD) and the Ministry of Atomic Energy, Russia (MINATOM) concerning the Safe and Secure Transportation and Storage of Nuclear Weapons Through the Provisions of Armored Blankets.
- c) 17 June 1992: Agreement between DoD and MINATOM concerning The Safe and Secure Transportation and Storage of Nuclear Weapons through the Provision of Emergency Response Equipment.
- d) 17 June 1992: Agreement between DoD and MINATOM concerning The Safe and Secure Transportation and Storage of Nuclear Weapons through the Provision of Fissile Materials Containers.
- e) 17 June 1992: Agreement to provide financial assistance for detailed planning and resource management to expedite CW demilitarization activities.
- f) 28 August 1992: Agreement between the DoD and MINATOM concerning the Provision of Cargo and Guard Railcar Conversion Kits.
- g) 6 October 1992: Agreement between the DoD and Russia for design of a Safe Secure and Ecologically Sound Storage Facility for Fissile Material Derived from the Destruction of Nuclear Weapons.
- h) 22 October 1992: Umbrella Agreement between the USG and Belarus concerning Emergency Response and the Prevention of Proliferation of Weapons of Mass Destruction.
- i) 22 October 1992: Agreement between the DoD and Ministry of Defense of the Republic of Belarus concerning the establishment of Export Control Systems.
- j) 22 October 1992: Agreement between the DoD and the Ministry of Defense of the Republic of Belarus concerning the provision of Emergency Response Equipment.
- k) 27 November 1992: Agreement between the US Government (USG) and Russia establishing an International Science and Technology Center.
- l) 15 January 1993: Agreement between DoD and the Ministry of Defense of the Republic of Belarus concerning the establishment of Continuous Communications Links.
- m) 18 February 1993: Agreement between the USG and Russia concerning the Disposition of Highly Enriched

UNCLASSIFIED

UNCLASSIFIED

Uranium Extracted from Nuclear Weapons.

- n) July 1993: Memorandum of Agreement between the USG and Ukraine concerning Defense and Military Contacts.
- o) July 1993: Agreement between the USG and Belarus concerning Site Restoration.
- p) July 1993: Agreement between the USG and Belarus concerning Export Control.
- q) July 1993: Agreement between the USG and Belarus concerning Defense Conversion.

J.

MILESTONE SCHEDULE:

- Performance accomplished in accordance with specific tasks as required.

UNCLASSIFIED

UNCLASSIFIED

RESEARCH AND DEVELOPMENT, TESTING AND EVALUATION (RDT&E)

Summary Data for Q4B

TOTAL RDT&E DEFENSE-WIDE

DEFENSE NUCLEAR AGENCY

FY 1993

FY 1995

Strategic

Tactical

Communications/Intelligence

All Other

276,033

273,041

Total

274,050

273,041

6 of 6

Attachment 10

UNCLASSIFIED